ARMOR AT WAR SERIES

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TANK BATTLES OF THE MID-EAST WARS

(2) THE WARS OF 1973 TO THE PRESENT

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INTRODUCTION

This book is the second volume in a series on armored warfare in the Mid-East over the past several decades. The central focus of these books are the wars involving Israel. Other major conflicts in the region, notably the 1980-88 Iran-Iraq war, are outside the scope of this series. The coverage of this volume is somewhat different than the preceding volume. The first volume covered four major wars, fought in the ideal tank country of the Sinai desert. During the period covered in this book, Israel has been involved in only one major war involving its armored force, the invasion of Lebanon in 1982. All of its fighting during this period has been in the hilly regions of the Levant which are not as suitable for large scale tank operations, and tanks did not play as central a role as in previous wars. Much of the fighting in Lebanon has taken place between various Lebanese militias, and this book provides a unique record of the unusual assortment of equipment used in the civil war fighting. Since the 1982 war, the IDF (Israeli Defense Forces) has been involved in many small scale actions in southern Lebanon. These have been anti-guerrilla operations rather than conventional war. Nevertheless they have usually involved the employment of armored vehicles. This book examines the shift from the IDF's tank-heavy force prior to 1973 to the more balanced mechanized force which continues to evolve to this day.

The Post-1973 Israeli Armored Force

The 1973 Mid-East War revealed fundamental flaws in the organization of the Israel Army. The exaggerated importance given to the armored force and the neglect of the two other main combat arms, infantry and artillery, were an underlying factor in Israel's defeats and battlefield setbacks at the outset of the 1973 war. These lessons were appreciated and the IDF set about rectifying them in the subsequent years. While the tank remained the primary weapon of IDF's ground forces, considerable attention was paid to raising more infantry units, and mechanizing them with improved equipment, especially the American M113 armored personnel carrier. In the decade following the 1973 war, Israel received over 6,000 M113 APCs and their derivatives from the United States. They were popularly called "Zelda" in IDF service. Due to the mechanized nature of the Israeli armed forces, the artillery force was modernized mainly with self-propelled weapons. By the time of the Lebanon War, Israel had received 327 M109 self-propelled 155mm howitzers and 108 M107 175mm self-propelled guns from the United States.

The Israeli armored force's leader, General Israel Tal, had long been pushing for a new tank, and was finally granted his wish in 1970 with the beginning of the Merkava (Chariot) project. Until this time, Israeli experience in tank development had been limited to tank upgrades. The Merkava was not an entirely indigenous design as is often claimed, but rather an amalgamation of foreign armament and powertrain technology to a novel Israeli hull and turret design. The engine, transmission, fire controls and many subsystems were American or derived from US systems, and the suspension and gun were derived from British designs.

The main focus of the design was to increase crew protection compared to the 1950s generation of NATO tanks such as the Chieftain and M60. In contrast to American and European tanks of the day, the Merkava had its turret at the rear. This was done to use the engine and transmission in the forward part of the tank as a form of passive protection for the crew. This had additional benefits, such as the ability to evacuate the crew from the rear, and to more easily reload ammunition. The new armor package made the Merkava virtually impervious in the frontal quadrant to typical threats of the day including the Syrian T-62's 115mm tank gun. This configuration is not favored elsewhere in the world since it makes repair and replacement of the powerpack considerably more difficult and time consuming, it places the drive sprocket at the front of the tank where it leads to more frequent damage to the powertrain in peacetime training, and it leads to a strong thermal signature at the front of the tank which can interfere with the new thermal imaging sights that were being introduced at this time in the US Army and elsewhere.

Although the Merkava represented a significant improvement in protection compared to the M60 and Chieftain, it did not represent as revolutionary a leap forward in tank development as other contemporary designs such as the M1 Abrams. The newer generation of American and European tanks were introducing a new type of laminate armor that offered better protection than that on the Merkava in less volume and weight. In addition, tanks like the Abrams introduced fundamental improvements in tank firepower due to the synergistic effect of digital ballistic computers, laser range finders, stabilization systems, and thermal imaging sights. Regardless of these developments elsewhere, the Merkava was well suited to operations in the hilly country of the Levant where it would see all of its combat over the next two decades. The first batch of 40 Merkava tanks was delivered in 1978 for trials purposes. A total of slightly more than 400 had been ordered through 1982.

At the time of the 1982 war, only about 200 Merkava tanks were available and the IDF still depended heavily on M60 tank. Through the early 1980s, the US had delivered about 750 M48 and 650 M60 and M60A1 tanks to Israel. As was evident from the 1973 war, these tanks were vulnerable to close-range attack by infantry armed with RPG-7 rocket launchers and Malyutka (AT-3 Sagger) anti-tank missiles. This led to a program to improve their protection, since it was realized that the hilly terrain of Lebanon favored the use of concealed infantry anti-tank teams. Before the outbreak of the war, the tanks were fitted with Blazer armor, an innovative type of explosive reactive armor based on an earlier West German design. Explosive reactive armor consists of an armored box containing a steel plate and a layer of plastic explosive. When detonated by the impact of a missile or RPG warhead, the explosive propels the steel plate into the path of the detonating warhead, disrupting its effects. The Israeli use of Blazer was the first time ERA was deployed and used in combat. The majority of the 1,025 tanks used by the IDF in the 1982 Lebanon War were M60 Magach with Blazer armor. The Centurion Shot was

still in use with the IDF in 1982, though in decreasing numbers. As in the case of the M60, it had been retrofitted with Blazer armor.

The Lebanon Caldron

Most of the conflicts fought by Israel after the 1973 war involved Lebanon. This small country had avoided involvement in most of the previous conflicts in the region, and prided itself on its reputation as the "Switzerland" of the Mid-East, a powerful banking and commercial center which remained neutral in the disputes between Israel and its neighbors. Lebanon was a diverse society with a significant Maronite Christian community as well as multifaceted Muslim communities. A fragile political balance had existed between the various religious and ethnic communities since it's independence three decades before. This balance finally disintegrated in the early 1970s as a result of spill-over from the wars in the region. In 1970, the Jordanians defeated the Palestinian Liberation Organization (PLO) and pushed it out of Jordan. With Syrian support, the PLO shifted its military bases into Lebanon and took control over the refugee camps south of Beirut. The PLO began conducting guerrilla attacks into northern Israel from the sanctuary of Lebanon and Israel responded with armed incursions. If this wasn't enough, the Shiite Muslims in southern Lebanon and in the Beirut slums had become radicalized under the leadership of Imam Musa Sadr, rejecting the leadership of both the Maronite Christian and Sunni Muslim establishment. The Shiites formed their own militia, called the Amal.

Animosities within Lebanon finally led to outbreak of full scale civil war in Lebanon in the autumn of 1975. The Muslim and Maronite militias battled each other across the "Green Line" in central Beirut, and militias laid siege to the villages of opposing groups. The multi-ethnic Lebanese Army disintegrated in February 1976, and Muslim troops allied themselves to the Druse, PLO and other Muslim militias to form the Lebanese Arab Army. The addition of the PLO and former Lebanese Army units to the Muslim militias threw the balance in their favor, and out of desperation, the Maronite Christian leaders called on Syria to intervene. The Syrian Army entered Lebanon in April 1976, and in the summer, joint operations by the Syrians and Maronites reversed the earlier defeats. A ceasefire was declared in November 1976 after about 35,000 people had been killed during the fighting. The Maronite-Syrian alliance lasted only about a year. Syria was antagonized by Israel's support of Christian militias in southern Lebanon, and eventually fighting broke out between the Christians and Syrians in Beirut in 1977. To further complicate matters, the PLO and Syria restored relations in spite of over a year of bitter fighting, and now allied themselves against the Christian forces.

After months of PLO raids from southern Lebanon, in March 1978 the IDF launched Operation Litani, an effort to clear PLO forces out of the southern Lebanon border area. Although the IDF seized the area up to the Litani river, it failed to crush the PLO units in the area since the fighters simply withdrew into PLO enclaves near Beirut. The IDF was forced to withdraw due to US diplomatic pressure, but installed a Christian Lebanese militia under Major Saad Haddad, the so-called Army of Free Lebanon (or Southern Lebanon Army: SLA) in the border zone. By this stage, the civil war had degenerated into wars within wars. The Christians were fighting among themselves, with clan pitted against clan, some backing alliances with Syria, others preferring alliances with Israel. In 1979, the pro-Syrian Christian Chamoun militia was forcibly incorporated into the pro-Israeli militia, resulting in the new Lebanese Forces.

The Israeli 1978 operation did not end shelling or guerrilla raids from southern Lebanon, and the IDF responded with a violent series of air raids against suspected PLO bases. In the spring of 1981, Syria began to move air defense missiles into eastern Lebanon to protect its forces against possible Israeli air attack. In conjunction with the growing political anarchy in Lebanon, the Israel government became convinced that another military operation in Lebanon would be needed to restore order.

Opposing Forces in Lebanon

Prior to the beginning of the 1982 war, the Syrian Army had about 40,000 troops in Lebanon and controlled about 70% of the country including the capital of Beirut. The most powerful force was the 1st Armored Division in the Bekaa Valley, equipped with T-55 and T-62 tanks, and composed of the 76th and 91st Armored Brigades and the 62nd Infantry Brigade. The next most important Syrian units was the 85th Independent Infantry Brigade, stationed in Beirut itself and supported by a few companies of T-54A/T-55 tanks. The Syrian forces were well trained and well disciplined, and in particular, the Syrian special forces units gave the IDF a very hard time in the 1982 war.

Yasir Arafat's PLO had about 15,000 armed fighters in Lebanon, with about 6,500 in Beirut and a similar number in southern Lebanon. The PLO was in fact an umbrella organization, and many of the militia fighters owed their allegiance to their specific faction such as Fatah, PFLP, PFLP-GC, DFLP, etc. The professional PLO troops were organized into the six brigades of the Palestinian Liberation Army (PLA). Four of these brigades were permanently stationed in Lebanon: Yarmuk, Kastel, Ain Jalut, and the Karameh Brigades, while the Qadisiyeh and Hittin Brigades were deployed in Syria. The PLA Kastel Brigade, commanded by Col. Haj Ismail, had 6,000 armed fighters in Tyre and Sidon and was the only regular PLO unit to face the IDF in the coastal region south of Beirut. Parts of the Qadisiyeh and Hittin Brigades were shifted from Syria to the Beirut area and served under Syrian control as part of the Arab Deterrent Force (ADF). The PLO had a total of about 40-60 ex-Hungarian T-34-85 tanks and 40-50 T-55 tanks on loan from the Syrian Army. The PLO also had a good arsenal of support weapons including heavy towed artillery, truck-mounted BM-21 and other types of multiple rocket launchers, and modern air defense weapons including ZSU-23-4 Shilka air defense gun vehicles and Strela-2M (SA-7) manportable air defense missiles. Although the PLO fighters were often very dedicated, the units tended to suffer from a lack of well-trained and experienced officers.

The Shiite Amal militia was independent of the other Muslim militias and numbered about 6,500 armed fighters centered in Beirut and southern Lebanon. The other main Lebanese irregular force was the Hizbollah militia, supported by Syria

and Iran, which had about 3,500 armed fighters. Iranian forces were also present in the form of about 2,000 Pasdaran volunteers near the Bekaa town of Baalbek who ran a training camp for the Hizbollah. Muslim units of the former Lebanese Army numbered about 17,000 troops and were commanded by Major-General Sami Khatib. The Druze in the Shouf mountains had their own Popular Socialist Party Militia with about 4,000 armed fighters.

The Maronite Christian units of the former Lebanese Army numbered about 20,000 troops and were commanded by General Michel Aoun. In addition, there was a separate Maronite Phalangist militia associated with the Kataeb Party formerly controlled by the Gemayel family and commanded at the time of the 1982 war by Samir Geagea. It numbered about 8,000 troops and was friendly to the IDF. Finally, there was the South Lebanese Army (SLA), a militia force raised and equipped by the IDF to patrol the southern border area.

Operation Peace for Galilee

The immediate events that provoked the Israeli invasion on 6 June 1982 were the continuing string of PLO actions against Israel culminating in the attempted assassination of the Israeli ambassador in London. The Israeli Defense Force (IDF) staff prepared three options for the Israeli response:

1. A shallow operation into southern Lebanon to clear PLO camps near the border and similar to the March 1978 Operation Litani.
2. A deeper operation to the Alawi river or to the outskirts of Beirut to clear the PLO strongholds in Tyre and Sidon but avoiding a clash with the Syrians or a direct intervention into Beirut,
3. "The Big Pines Plan" which envisioned confrontations with Syria and intervention into Beirut.

The Israeli government under Prime Minister Begin rejected the "Big Plan", favoring the second, more limited option. But the defense minister Ariel Sharon manipulated events to ensure that "the Big Pine Plan" was carried out. As a result, the IDF was entangled in a situation where it was to ostensibly carry out a relatively limited, short operation in Lebanon, while at the same time, its senior leadership, against government intent, was attempting to fundamentally expand the operation. This conflict within Israel's national command was at the heart of the strategic failure of Operation Peace for Galilee.

The fighting began on 5 June 1982 when the Israeli Air Force (IAF) began a bombing campaign to retaliate against the assassination attempt against the Israeli ambassador in London. Following this, the IDF began to intervene on the ground on Sunday, 6 June 1982 with Operation Peace for Galilee. The Israeli operation was a three pronged assault with the Western Force advancing towards Beirut along the Mediterranean coast, a small Central Force advancing up the Lebanon mountains to cover the flanks of the other two forces, and the Bekaa Forces Group which was aimed at confronting and destroying the Syrian forces in the Bekaa Valley in north-eastern Lebanon on the Syrian border.

The Western Force: Urban Warfare along the Coast

The Western Force was assigned the task of rapidly storming the PLO strong-holds along the coast. In contrast to the other two forces, the Western Force was not expecting to encounter any significant armored opposition, and instead would be involved mainly in clearing out PLO fighters from the camps and small towns. The Western Force had a total of about 22,000 troops and 220 tanks, with a relatively large component of infantry, engineers and paratroopers.

The attack was spearheaded by the Merkava tanks of Col. Eli Geva's 211th Armored Brigade attached to Brig. Gen. Yitzhak Mordechai's Division 91. The first instance of intense fighting occurred almost immediately as the IDF seized the city of Tyre, about 25 km north of the Israeli border. The seizure of Tyre was deemed important, not only for its position on the road to Beirut, but to convince the PLO that the IDF could and would engage in urban warfare if necessary. From the outset, the IDF understood that psychological aspects of the campaign were vital, with demoralization of the PLO fighters a major objective. Tyre was rapidly seized by a three-pronged assault including a battalion-sized amphibious landing from the north that cut off the PLO as well as any reinforcements. The IDF spearhead was through Tyre by dusk, though bitter clean-up operations remained. The IDF generally underestimated the time it would take to clear Tyre due to the tenacity of individual groups of PLO fighters.

While the initial assault on Tyre was taking place, the IDF launched another amphibious landing north of the city of Sidon by Brig. Gen. Amos Yaron's Division 96, with the same aim of beginning the encirclement of the city. This included a naval commando detachment, paratroop battalion and supporting arms. IDF columns from Tyre to the south reached Sidon late on 6 June, and actual military operations against the city began on 8 June. The fighting lasted for four days through 11 June. This phase of the operation took longer than anticipated, as under optimistic planning, it was felt that the IDF could reach the outskirts of Beirut by H +72 and seize Beirut with the help of the Christian Lebanese Forces (LF) by H +96. In fact by 9 June, the Eastern Force was heavily committed to urban fighting along the coast from Tyre in the south to Damour in the north, and not yet ready to move on Beirut.

The Central Force

The Israeli attack in the center consisted of two divisional groups and was intended to deal with the PLO in "Fatahland" around Arnoun and Nabatiya, and to sever the main Beirut-Damascus road to prevent Syrian reinforcements from reaching the capital. It was spearheaded by Brig. Gen. Avigor Kahalani's Division 36, widely regarded as Israel's best armored division, and by Brig. Gen. Menachem Einan's Division 162. This force had the mission of attacking from the area near Metulla in the Golan Heights across southern Lebanon and linking up with the Western Force near Sidon, thereby cutting off retreat of many PLO units. Division 36 included two armored brigades and the Golani Brigade which for this operation had been mounted on M113 armored transporters. During the initial move into Lebanon one of its first actions was to deploy a reconnaissance unit from the Golani Brigade to seize Beaufort Castle, which had been used by the PLO for propaganda broadcasts for many years. There was little other fighting in the central sector on the first day of the operation, and the main problem was the congestion

caused by all the mechanized columns moving into the hill country of southern Lebanon with its narrow roads. Division 36 broke off westward, reaching Sidon on 7 June. It linked up with Mordechai's Division 91, and began combat operations against the PLO around the coastal city. The Golani Brigade became actively involved in intense urban fighting within Sidon against the PLO.

Einan's Division 162 continued to move northward through central Lebanon with an aim towards reaching the main Beirut-Damascus highway. In response, the Syrians began to deploy the 424th Infantry Battalion to Jezzin, supported by a tank battalion. The first serious encounter with the Syrians took place on the third day of the operation, at 1530 on 8 June, when lead tank elements of the division were struck by Gazelle helicopters armed with HOT anti-tank missiles. Two tanks were hit, blocking the narrow road. That night, the lead units again came under fire near Ein Zhalta when they were surprised by a Syrian task force consisting of a few dozen tanks, and well entrenched infantry with RPG-7s and Malyutka (AT-3 Sagger) anti-tank guided missiles (ATGM). Elsewhere in the sector, Israeli UAVs (unmanned aerial vehicles) detected a Syrian force moving through the Shouf mountains towards Cohen's 460th Brigade, which was rebuffed by air attack. An intense fight followed in the streets of Masgarah with significant losses on both sides. There was also a serious fratricide incident near the Ein Katrina cross-roads when two battalions of the brigade mistook each other for Syrians and exchanged fire for two hours. That night, the lead column was again hit by Syrian infantry. The Israelis countered by moving an infantry battalion by helicopter into the Syrian rear, undermining the Syrian defense.

After days of heavy fighting, Einan's Division 162 finally fought its way past Ein Zhalta to the outskirts of Ein Dara on 10 June. UAVs were again instrumental in sniffing out a Syrian tank ambush on the way, and an AH-1 Cobra mission attacked the Syrians from the rear, destroying them with TOW anti-tank missiles. Einan's tanks were deployed in the hills near Ein Dara, where they could oversee the key Beirut-Damascus highway. This unit moved no further for the next few weeks, its immediate objective having been accomplished.

The Bekaa Force

The Bekaa Force was the strongest arm of the Israeli advance in terms of armor, since it was expected to encounter the Syrian force in the Bekaa Valley. This corps-sized force commanded by Maj. Gen. Avigdor Ben Gal, included five divisional groups with 38,000 troops and 800 tanks. It was spearheaded by Brig. Gen. Immanual Sakel's Division 252 moving into Lebanon from the Golan Heights, and Brig. Gen. Giora Lev's Division 90 moving along the main highway, followed by the Vardi Force and additional units including Gen. Moshe Peled's Special Maneuver Force. These units moved through the hill country for nearly three days without encountering serious resistance. By 8 June, Syrian forces in the Bekaa Valley were being enveloped by the Central Force and the Bekaa Force. On 9 June, the Israeli Cabinet gave permission to systematically eliminate the Syrian air defense missiles in the Bekaa as a prelude for any encounter between the Israeli and Syrian main forces. After preliminary reconnaissance and probing with UAVs, the IAF attack began at 1400 in the afternoon. The attack blossomed into full-scale dogfights between the IAF and the Syrian Air Force. By the day's end, the Syrian Air Force had lost 41 aircraft and 17 of 19 missile batteries in the Bekaa Valley.

The air battle continued the next day, 10 June, when the IAF attacked the two remaining SAM batteries. The Syrian Air Force and IAF fighters again tangled, the Syrians losing another 25 fighters. On the ground, the IDF Bekaa Force finally came into contact with the Syrian 1st Armored Division. The IDF force substantially outnumbered the Syrians, attacking with three divisional sized forces. The initial Syrian positions consisted of strong-points set up along the winding roads leading into the valley. Each strongpoint had obstacles, mines, Malyutka and RPG-7 infantry anti-tank teams, and dug-in T-55 and T-62 tanks. Some of the key positions were also supported by artillery and Gazelle helicopters armed with HOT anti-tank missiles. Syrian resistance was stiff, and on more than one occasion, Syrian infantry infiltrated into Israeli positions causing significant damage with RPG-7s.

The IDF divisional commanders were all warned of government plans to accede to a US-sponsored ceasefire on 11 June, so pushed their advance forward through the night. This proved dangerous when a reserve battalion from Division 90 passed through a small village near Sultan Yakoub, and unbeknownst to them, was recently occupied by a Syrian mechanized brigade. Three companies of the battalion made it through the village under a barrage of Malyutka missiles and RPGs, only to find themselves trapped on the other side in the middle of the Syrian brigade. The isolated battalion came under fire the next day from the surrounding hills, and an attempted tank thrust to relieve the battalion was rebuffed by the Syrians. Finally, 11 battalions of IDF artillery were used to pummel the Syrian positions, and to create a box in which the battalion could withdraw the five kilometers back to Israeli lines. At least eight tanks were lost in the incident, and it is believed that this was the source of the M48 with Blazer armor that the Syrians turned over to the Soviet Union after the war.

The fighting continued the following morning, as both sides sought to gain the maximum advantage prior to the noon ceasefire. Sakel's Division 252 moved along the Israeli right flank, but was slowed down by repeated attacks of Syrian Gazelles. Prior to the ceasefire, lead elements reached the village of Yanta, only 25 kilometers from Damascus. The approach of the IDF forces so near to the Syrian capital led to the commitment of the 3rd Armored Division to the battle. Its lead element, the 82nd Armored Brigade, stumbled into Peled's Special Maneuver Force, and in a brief and one-sided fire fight, lost nine new T-72M tanks mainly to an ambush by jeep-mounted TOW anti-tank missiles. The ceasefire minutes later put a halt to the fighting in the Bekaa Valley.

The Attack on Beirut

Syrian forces in Beirut had been ordered to stay out of the fighting, but after the IAF attacks on Syrian missile positions in the Bekaa on 9 June, they began deploying for combat. The Syrian 85th Brigade deployed tank and infantry forces south of the capital and in the hills to the east. On 11 June, Yaron's Division 96 reached the outskirts of Beirut, and ran into a

defensive line held by the PLO and Syrian 85th Brigade, well dug in with Malyutka and Milan anti-tank missiles. The Golani Brigade attempted to outflank the defenses but ran into a Syrian ambush in the Dokha suburb.

The US-brokered cease-fire between IDF and Syrian forces on 11 July did not hold in the Beirut area though it did hold in the Central and Bekaa sectors. Through 11-12 June, the Israeli infantry engaged the tenacious Syrian and Palestinian defense in the suburbs of Beirut. Israeli forces linked up with the Christian Phalangist militia in Beirut on 13 June, but found to their considerable consternation that the Lebanese Forces were not willing to fight in the military campaign against the PLO and the Syrians.

The beginning of the urban warfare stage of the Beirut campaign began on 13 June as the IDF tried to surround and seal off the city. The delay in initiating the assault into Beirut was closely linked to the controversy over the plans for the Lebanon operation. Prime Minister Begin had specifically forbidden an initiation of urban warfare in Beirut. As a result, the IDF was forced to delay their intervention into the city until Sharon could convince the cabinet. This permitted the PLO to harden their defenses in the city and to conduct a much more deliberate defense than was encountered in either Tyre or Sidon. On 22 June, an IDF armored force was trapped near the Beirut-Damascus Highway, but fought itself free with the help of the Golani Brigade. In the meantime, other IDF units caught the Syrians moving 130 tanks and tank transporters along the Beirut-Damascus Highway in an attempt to reinforce positions near Beirut; the column was overwhelmed by IDF armored units.

On 22-24 July, IDF forces began operations to push the Syrians out of their positions east of Beirut. This began the actual battle for the city, a battle which the Israeli government had intended to avoid. The IDF used tanks and mechanized infantry to seal off Muslim West Beirut from Christian East Beirut.

Armor in Urban Fighting

The fighting in Beirut in 1982 saw the most extensive use of tanks in any urban battle since Berlin in 1945. Tanks did not figure prominently in the previous fighting in Beirut in 1975-76. This was in part due to the antiquity of many of the Lebanese vehicles, either World War 2-era types such as the M4 Sherman or British Charioteer, or 1950s light tanks such as the M41 and AMX-13. The Lebanese found tanks to be vulnerable to broken tracks due to rubble as well as to mines. In addition, the tanks were vulnerable to RPGs fired from overhead from the roofs of buildings. When used in the earlier civil war fighting, tanks were most often employed from static positions, often as fixed defenses behind berms of debris.

The Syrian use of tanks in Beirut in 1982 was largely based on unfavorable lessons from earlier fighting in the Lebanon civil war. A tank attack into Sidon during the 1976 civil war led to the column becoming trapped on the streets and wiped out by militias armed with RPG-7s. A similar experience was suffered at the hands of the Lebanese Arab Army in the fighting for Bhamdun on 13-16 October 1976. The 1976 Lebanon fighting convinced the Syrians of the need to support tanks in an urban environment with infantry. Indeed, the preferred solution was the use of special forces infantry units. During the fighting on the approaches to the Beirut airport in August 1982, the IDF was halted by a task force of the Syrian 85th Mechanized Infantry Brigade made up of a Special Forces group of three battalions and a tank battalion. The PLO, although it had both T-34-85 and T-55 tanks in Beirut, did not use them effectively. This was probably due to a lack of training, and a desire not to lose such valuable weapons to the IDF.

The Syrian Army found that anti-aircraft guns were especially valuable in the Lebanon civil war, used against infantry in buildings. The ZSU-57-2 self-propelled twin 57mm gun had proven particularly effective in the fighting in Sidon in 1976 since it could easily devastate the typical concrete and stucco structure of the local houses. As a result of those experiences, it was standard Syrian tactical doctrine to deploy an anti-aircraft section of ZU-23 23mm cannon with a tank battalion when operating in an urban environment, often mounted on trucks. The PLO and many Lebanese militias also shared this view. While they had few self-propelled anti-aircraft vehicles, they improvised by mounting ZPU-1/-2/-4 14.5mm heavy machine guns and ZU-23 23mm auto-cannons on light trucks and other vehicles, including M113 APCs.

The centrality of the tank in Israeli tactical doctrine led the IDF to examine the way in which tanks can be best employed while at the same time guarding against their recognized vulnerabilities. The IDF doctrine stressed that tanks should be supported by a combined arms team including infantry, artillery and combat engineers. Infantry was especially important to secure an area seized by armor, and infantry was also vital to hold on to an area seized by the tanks. In an urban environment, infantry played an especially large role in protecting the tanks from ambush by enemy RPG teams.

The IDF skewed the force configuration of its three attacking forces to give the units of the Western Force more Merkava tanks, which offered better protection than the M60 Magach. Although the IDF doctrine stressed combined arms tactics in urban combat, it was also recognized that the speed and shock value of tanks could sometimes compensate for a lack of infantry, and that tanks should be prepared to fight in an urban environment without infantry. The IDF was very successful in its use of tank in Beirut, finding that tanks were the single most valuable weapon in suppressing enemy fire. A common tactic was to fire at the building with white phosphorus. Even if the projectile did not kill the PLO fighters, the shock, noise and smoke usually convinced them to abandon the building. The IDF also found that Air Force M163 Vulcan 20mm self-propelled anti-aircraft guns were valuable in urban warfare. These weapons had very high elevation and so were useful to attack targets in upper stories of buildings, and the high volume of fire was very effective against snipers and intimidated opponents.

During the Beirut fighting, the IDF made extensive use of direct fire artillery, principally the M109A1 155mm self-propelled howitzer. There were two main tactics. Some of the surrounding hills outside the city were located too far away for effective tank gun direct fire so the longer-ranged self-propelled howitzers were used. Self-propelled howitzers were also used at

close range during specific assaults where reinforced buildings had to be attacked. The much heavier high explosive projectiles of the M109 were found to be very effective in reducing strong-points, and in some cases, causing the complete collapse of buildings. When used in this role, the M109 was kept to the rear of a combined arms formation, usually with a Merkava tank unit in front to suppress snipers or RPG gunners. The need to use the M109 in direct fire in the city itself was partly due to the fact that most contemporary tank guns lack a high explosive-fragmentation round, and the normal HEAT and APFSDS ammunition is not as effective in destroying concrete structures.

The Beirut Siege Ends

On 29 July, the PLO announced its plans to withdraw from Beirut, a pledge that was not taken seriously by the IDF. The IDF responded to PLO in action by intensifying its siege, seizing the Beirut airport on 1 August, and beginning a campaign of salami tactics, slicing off bits of PLO controlled territory by determined ground attacks. This was accompanied by intensive IAF bombing of PLO positions in the city. Defense minister Sharon was finally sacked on 12 August for his actions and Israel accepted the US-brokered Habib peace plan. A firm agreement on PLO withdrawal was finally reached by the third week of August, and PLO withdrawal took place from 21 August to 3 September 1982, along with withdrawal of the one Syrian brigade in the city. A Multinational Force involving French Foreign Legion, Italian Army, and US Marine troops was involved in the cease-fire agreement.

The campaign against the PLO in Lebanon in 1982 was a tactical victory for the IDF but a strategic defeat for Israel. The IDF decisively defeated the PLO in the initial urban battles in Tyre and Sidon. Although the IDF succeeded in its objectives of forcing both the Syrians and PLO out of Beirut in the second phase of the operation, it neither managed to turn the political trends in Lebanon in its favor nor did it crush the PLO. The IDF proved most skilled in realizing its military goals, especially against the Syrian Army in the Bekaa Valley. However, insufficient preparation had been undertaken to achieve the broader and more important political goals of the campaign due to the sharp differences within the Israeli government and the ministry of defense. In subsequent years, Syria managed to reassert its control over Lebanon, much to Israel's chagrin.

Unlike previous wars, urban warfare played the central role in the Lebanon campaign, and the IDF was not as well prepared for this type of operation as for mechanized operations in open country. The 1982 Lebanon War was a fundamentally different type of conflict than the Mid East wars that had preceded it, and provided a foretaste for the ensuing decade of trouble along the southern Lebanon border.

Lessons of the War

The 1982 fighting in Lebanon was intense and costly for the IDF. Nearly a third of the IDF's tanks, 300 of 1,025 were damaged in combat. Of the 300 tanks damaged, 108 suffered severe damage and 92 tanks had their armor penetrated either by tank gunfire, RPG-7s or missiles. Of these, 52 tanks were destroyed including 37 M60 Magach tanks, 8 Centurion Shot tanks and 7 Merkava tanks. Precise figures for Syrian losses are lacking, but approximately 400-500 tanks were lost including about 200 that were abandoned and recovered by the IDF nearly intact. Of those knocked out in combat, about 70% fell victim to IDF tanks, and the remainder to TOW anti-tank missiles or air attack.

The 1982 war was the first time that anti-tank helicopters were used in significant numbers. The Syrian Gazelles conducted 93 sorties and hit seven IDF tanks. Gazelle losses were high, totaling 12 helicopters of which one was downed by a TOW missile fired by an Israeli Hughes MD-500 Defender and one was shot down by Merkava tank fire. Although not particularly destructive in materiel terms, the Gazelles had a psychological impact far out of proportion to their numbers, as they often attacked, unseen and unheard, from long ranges. The IDF operated 12 AH-1S Cobras and 30 Hughes MD-500 Defenders, losing four in combat including two "own goals" to IDF air defense. They conducted 130 sorties and were credited with 29 tanks, 4 APCs, 22 other AFVs, 30 trucks, 2 Katyushas, 4 radars and 20 bunkers.

The IDF had very mixed feelings about the new M113 Zelda armored personnel carrier. On the one hand, it provided the necessary mobility for the infantry. On the other hand, its protection was inadequate. Although the doctrine called for the infantry to dismount to fight, the fast tempo of operations led to the infantry remaining in the Zeldas even when in contact with the enemy. The IDF encountered serious problems with the M113 after bypassing Tyre when operations took it into the hill country south of Beirut. PLO ambushes of Israeli columns with RPGs caused extensive casualties. In some IDF units, the troops would not remain inside the M113 after having seen other APCs burn out after having been hit. This lack of confidence in the ability of the M113 to protect its troops led to the IDF abandoning its use in later urban engagements where it was presumed it would be especially vulnerable to RPG fire.

The lack of an infantry vehicle for urban fighting was overcome by several expedient solutions. The unusual configuration of the Merkava tank, with its rear mounted turret, provided one option. This tank had been designed for rapid ammunition re-supply with a pair of ammunition cassettes at the rear of the hull, accessible by a pair of doors. By removing the 48 round ammunition racks, about 10 troops could be carried in cramped quarters. This was not a problem in urban warfare, since the operations were usually of very short duration not requiring large amounts of ammunition, and the protection afforded by the tank was much appreciated. The Merkava was also used as an improvised armored ambulance to extract wounded infantry using the same method.

The IDF also had an armored engineer vehicle, the Nagma-shot, based on turret-less Centurion tanks, that could be used as an improvised infantry assault vehicle. This vehicle had a large compartment in the center to carry engineer troops, but it could be used when necessary for moving infantry. The glacis and the new hull superstructure were protected by Blazer reactive armor. These were used in the Beirut fighting to provide support for tanks. They are sometimes misidentified as Centurion APCs. However, they were not originally intended as infantry vehicles.

Trends in IDF Armor after Lebanon

Development of an improved version of the Merkava tank, the Merkava Mk. 2, was already underway before the 1982 Lebanon War and improved versions such as the Merkava Mk. 2B benefited from the lessons of the campaign. The primary emphasis of the new version was to add additional protection in the form of appliqué armor panels. In addition, there were fire control improvements to bring the tank closer to the American M60A3, including a new laser rangefinder. Encounters with the T-72 in 1982 and the capture of several vehicles led to the decision to eventually move to a more powerful 120mm gun, compatible with NATO 120mm ammunition. This emerged in 1989 as the Merkava Mk. 3. This new version is in reality a substantial redesign of the Merkava, including a new generation of passive armor, significant fire control improvements, and mobility improvements including a more powerful engine and suspension upgrades. The Merkava Mk. 3 was first deployed with the 188th Barak Brigade.

The Centurion was gradually retired as a main battle tank after the 1982 war, although some remained in use with reserve units. The initial M60 Magach with Blazer ERA was improved under the Magach 6B Gal program which introduced a new fire control system, a thermal sleeve for the main gun, and other upgrades. Older M60 tanks were rejuvenated in the mid-1980s in the Magach-7 configuration which uses a new generation of passive armor instead of the Blazer reactive armor used in Lebanon. The IDF has also experimentally fitted the 120mm gun into the M60A3, though it remains to be seen if many vehicles will be converted.

One of the outcomes of the Lebanon experience was the IDF decision in the early 1990s to build a heavy armored infantry vehicle, the Achzerit, based on surplus T-55 tank hulls. About 250 of these were built. They are intended to supplement the M113, especially in urban warfare environments. The IDF has not been entirely happy with the vehicle due its sluggish automotive performance compared to IDF tanks, its cramped internal infantry compartment, and the difficulty of egress for the infantry squad.

The M113 has gone through a series of upgrade programs to improve its survivability to RPGs and to make it more suitable for use in urban areas. With about 4,000 M113s in service, the IDF has no choice but to make the best of the situation by upgrading the M113. A small percentage of M113s used in Lebanon were fitted with a passive spaced armor. This was apparently effective, though somewhat heavy. After the war, this was improved using Rafael's TOGA appliqué armor. This is a carbon-steel, lighter-weight, perforated appliqué mounted to the hull sides and front of the vehicle and deployed through much of the 1980s.

The IDF was not entirely satisfied with the TOGA's protection against the RPG-7, especially from the side. As a result, a third armor upgrade effort was undertaken in the early 1990s using Rafael's EAAK (Enhanced Appliqué Armor Kit). Israeli M113s taking part in operations in southern Lebanon in 1996 have appeared with this upgrade.

The Centurion Nagma-shot engineer vehicle proved successful enough that a more refined design has been fielded, the Puma. The importance of the combat engineer armored vehicles in close-terrain and urban fighting typical of southern Lebanon is attested to by the fact that about 200 of these Centurion Puma conversions have been built. This is not intended to carry infantry, though about 7-8 personnel can be carried consisting of a crew of two-three and an engineer team of five. It is intended to serve in the spearhead of an armored attack alongside tanks. It is armed with three FN MAG 7.62mm machine guns, one an OWS remote control mounting that can be fired from within the protection of the vehicle. It is used to carry combat engineer equipment forward with the engineer team.

Reconstructing the Lebanese Army

Fighting between various militias continued sporadically after the Israeli pull-out. It was no longer in Syria's interest to permit Lebanon to descend again into anarchy, and political efforts were begun to reunite the factions and impose order through the use of a reconstituted national army. Syria's aims in Lebanon are to retain a degree of control since the Assad regime regards Lebanon as being part of greater Syria. In 1989, a national reconciliation pact was signed at Taif in Saudi Arabia in an attempt to reconstitute a national government. This agreement came closer to fulfillment in October 1990 when the Christian militia under General Aoun in Christian East Beirut was brought under control by a joint action by Syrian and Lebanese central government troops. Most militias gradually left Beirut after this show of force, but still remained armed in their regional strongholds. Lebanon and Syria signed a friendship and cooperation pact in May 1991, and Lebanon continues to be partially occupied by Syrian forces. Syrian forces continue to occupy parts of Beirut and in other regions including northern Lebanon and the Bekaa Valley. The Lebanese Army now numbers about 41,000 troops. It is organized into 10 infantry brigades and a Presidential Guard Brigade. In addition, there are 1 ranger and 3 special forces regiments, 2 artillery regiments, and 1 air assault regiment.

Israel has some troops in a 10-km deep security zone and the IDF arms and equips the Army of Southern Lebanon, numbering about 2,500 troops, which occupies the security zone. The IDF has periodically launched retaliatory raids into southern Lebanon over the past several years. These attacks have been directed mainly against the Hizbollah, numbering about 3,000 Shiite fundamentalists who periodically launch rocket attacks on northern Israeli towns. One of the largest of these raids was in April 1996. Codenamed Operation Grapes of Wrath, it consisted of artillery strikes into southern Lebanon, in response to Hizbollah rocket attacks. The strategic aim of the Israeli operation was to remind Syria and Lebanon that it could disrupt the current economic reconstruction of the country if Syria and Lebanon don't step on the recalcitrant militias.

A Syrian Army BTR-152V1 patrols the streets of Saida, Lebanon, in March 1978 during Syria's role as peace-keeper in Lebanon. The Syrian infantrymen are wearing a khaki copy of the U.S. M-65 field jacket with Soviet helmets. (J.B. Isaac/United Nations)

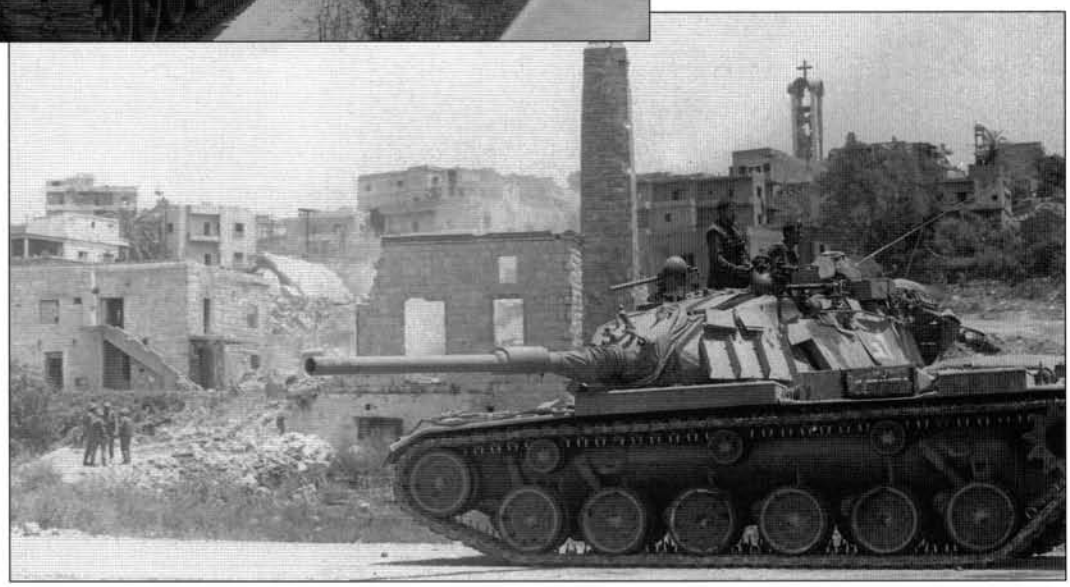
The Palestinian Liberation Army (PLA) received shipments of old T-34-85 tanks from Hungary in the late 1970s. Here, a PLA T-34-85 is transported to a new location near Jezzine in 1981. (Mohamed Assad)

A Syrian T-62 tank crew overlooks the Christian center of Zahle in central Lebanon. The town was subjected to a punishing barrage during the Syrian siege in 1981. (Lebanon Information and Research Center)

A group of officers from the IDF's Golani Brigade on a M151 jeep passes through a southern Lebanese village during Operation Litani, Israel's 13 March 1978 mini-invasion of Lebanon. Note searchlight attached to .30 caliber machine gun and crew's personal gear carried on the vehicle's exterior. (IDF Spokesman)

Prior to the IDF's invasion of Lebanon in 1982, the M48, M60 and Centurion tanks were reinforced with Blazer explosive reactive armor developed by Rafael on the basis of an earlier West German concept. This offered the vehicles like the M60A1 Magach a higher level of protection against shaped charge warheads such as those from RPG-7 rocket launchers and Malyutka anti-tank missiles. (IGPO)

Operation Peace for Galilee began with a massive three pronged drive into Lebanon from northern Israel. Here, an M60A1 Magach leads a column of M113 Zelda infantry transporters. (IGPO)



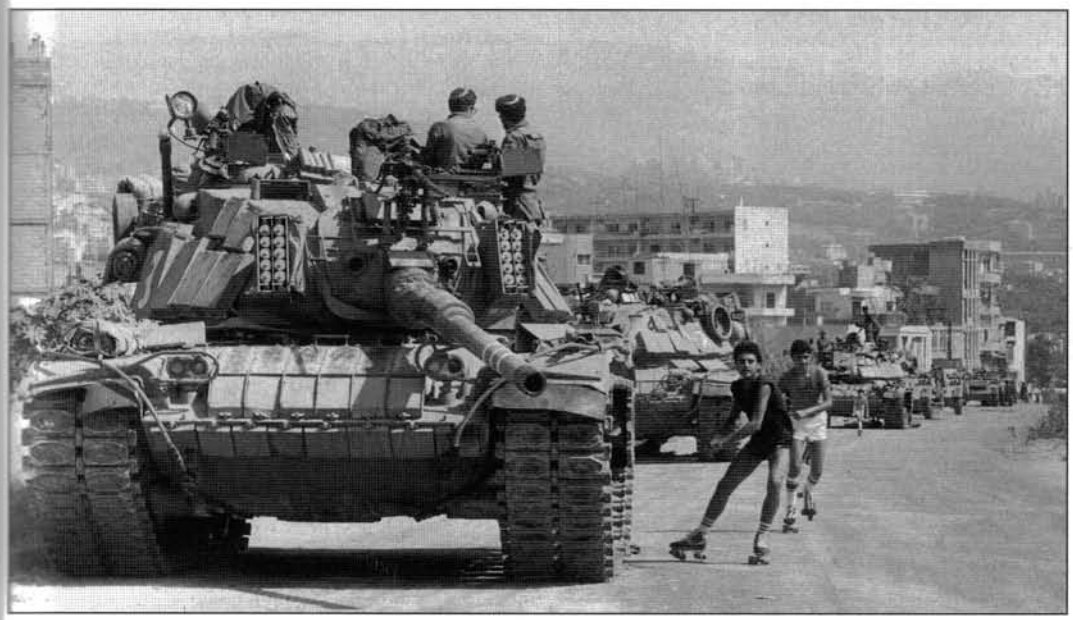
The fighting in Lebanon was very intense, especially in urban areas near the Mediterranean coast. Here an M60A1 Magach stands guard. Note that some of its Blazer panels are missing. These were probably not detonated, as the resulting explosion is usually quite noticeable. (IGPO)

The 1982 Lebanon War was the combat debut for the IDF's new Merkava tank. The Merkava was a response to the lessons of the 1973 war on the Golan Heights. This is probably a tank from the 211th Armored Brigade, which spearheaded the assault up along the Mediterranean coast. (IGPO)

Complete with blocks of Blazer reactive armor, a Centurion Shot slowly advances through PLO controlled territory in southern Lebanon during the Israeli invasion. Note thermal sleeve fitted to 105mm main armament gun. (IDF Spokesman)

One of the first objectives of the IDF's Center Force was the historic Beaufort Castle, which had been used by the PLO as a propaganda broadcast center for many years. It was taken after a sharp fight by a special reconnaissance team of the Golani Brigade, transported to the scene by a Nagma Shot combat engineer vehicle seen here. (IDF Spokesman)

A Merkava Mk. 1 tank of the 211th Armored Brigade engages targets in the outskirts of Lebanon during the second week of fighting. The large tarp over the turret rear is an orange air identification panel used to prevent accidental strikes by the IAF against friendly forces. (IGPO)



Lebanese children have become accustomed to war after nearly seven years of intermittent fighting in Beirut. Here, a couple of boys roller-skate past a column of IDF M60A1 Magach tanks. (IGPO)

Using the cedar trees and power lines as cover, an M60A1 Magach blasts away at a Syrian T-62 in eastern Lebanon's Bekaa Valley, 11 June 1982. Note the commander directing the fire from outside the turret. (IDF Spokesman)

A bivouac by troops from the Syrian 1st Armored Division on the vital Beirut-Damascus Highway. The white bands on the turret and gun barrel of the T-55 tank in the foreground are probably for tactical identification. (Lebanese Information and Research Center)

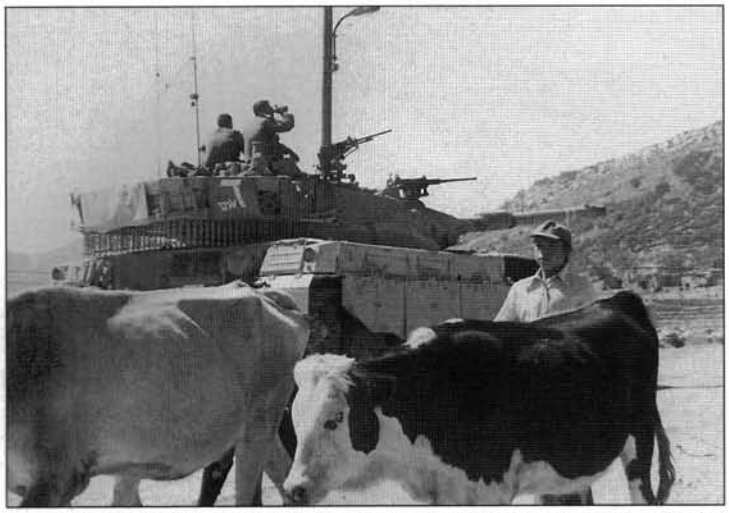
On the road to Beirut, an M60A1 Magach cautiously advances along the coastal highway. The painted turret identification number is somewhat more elaborate than usual. (IDF Spokesman)

A Centurion Shot MBT, nicknamed *Bazak* ["Lightning"], proceeds towards the Lebanese capital in June 1982. Note fully loaded rear storage bin behind turret and Blazer armor modifications. (IDF Spokesman)

A squad of paratroopers, in full combat kit complete with Kevlar flak vests, slowly advance through the Shouf foothills, near Beirut, as the drive towards the Lebanese capital continued in June 1982. Behind them is an M60A1 Magach with Blazer ERA. (Michael Zarfati/Bamachane)

A combined force of M60A1 Magach and Centurion Shot MBTs pass the battle-scarred landscape around Sidon, on 8 June 1982. Blazer reactive armor is fitted to both tanks. (Bamachane)

With weapons ready, an IDF M113A1 APC slowly passes through a Lebanese village, near Sidon, on 8 June 1982. (Michael Zarfati/Bamachane)



A Merkava Mk. 2 advances through the Bekaa Valley towards the strategic Beirut-Damascus Highway, a young boy tends his cattle. The ball and chain armor under the turret rear are a distinctive feature of the Merkava Mk. 2's turret. (IDF Spokesman)

Lebanese boys play near a parked Merkava tank of the 211th Armored Brigade in the Beirut suburbs during one of the lulls in the fighting. The crew gives some idea of the enormous size of the Merkava. This tank has a reduced profile turret, and as a result, its hull is considerably bulkier than contemporary main battle tanks. (IGPO)

Syrian infantrymen from the 85th Infantry Brigade deploy from a BMP-1 infantry vehicle under the watchful eyes of an officer near Baabda during the 1982 fighting. The 85th Brigade was the IDF's principal foe in the initial fighting on the approaches to Beirut. (Lebanese Information and Research Center)

Mechanized combat means frequent repair work. Here, an Ordnance Corps crew with their M113 Fitter's Vehicle repair a damaged Centurion Shot tank. The high intensity of the fighting in Lebanon meant that nearly a third of the IDF tank force was knocked out. Skilled maintenance crews were able to repair much of the damage in the field and put many of the tanks back into action. (IGPO)

The crew of a Centurion Shot perform routine maintenance during a lull in the fighting. (IGPO)

The mainstay of the Syrian 1st Armored Division in the Bekaa Valley was the T-55 tank like this one, though there was also a significant number of the more modern T-62 tank as well. (IGPO)

IDF reservists watch as engineers push a damaged T-55 out of its defensive entrenchment along the southern shore of Beirut onto an awaiting tank transport in the background. It is not clear if this tank belonged to the Syrian 85th Brigade or to one of the two allied PLA brigades which also had a small number of T-54A and T-55 tanks. (IDF Spokesman)

An IDF Ordnance Corps depot is chock-a-block with captured Syrian T-62s and T-55s after the Bekaa Valley fighting in 1982. (IDF Spokesman)

The crewman of an M60A1 Magach writes a letter home while resting on a large stack of discarded cardboard ammunition transport containers. (IGPO)

A lull in the fighting permits time for prayer. The M60A1 Magach in the background has the attachment for a mine-roller assembly. The large square box over the tank's gun mantlet is an infrared searchlight for night fighting. (IGPO)

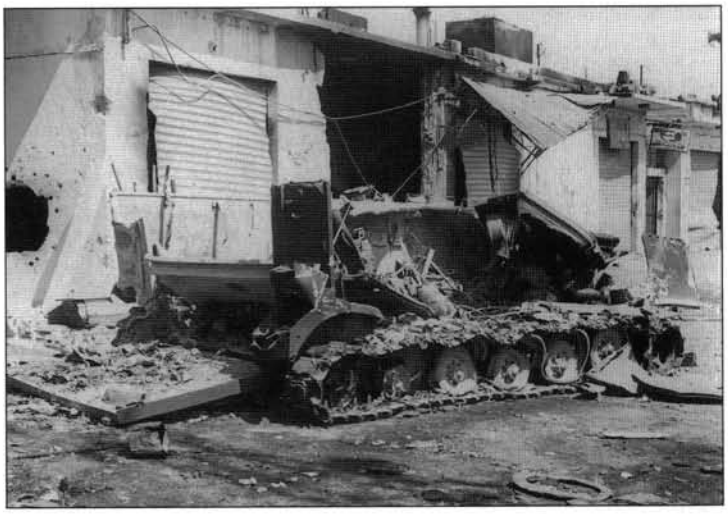
A paratroop antitank reconnaissance squad conducts a patrol of one of the Tyre's main thoroughfares. The M151 jeep-mounted TOWs were extremely successful during the 1982 Lebanon War, destroying dozens of Syrian main battle tanks, including the new T-72 in the Bekaa Valley fighting. Note the side mounted FN MAG 7.62mm light machine gun. (IDF Spokesman)

An Orev [Crow] antitank unit passes through Damur on the road to Beirut during Israel's push along Lebanon's Mediterranean coast, 10 June 1982. These M151 jeeps tended to carry a great deal of the crew's personal kit, and were usually fitted with a defensive machine gun on the right hand side, in this case a .30 caliber light machine gun. (IDF Spokesman)

An M113 Zelda APC moving up to the Lebanon border through northern Israel. On the bow is the usual orange air identification panel, and over the side are the infantry squad's pack and other gear. (IGPO)

The attitude of the Lebanese civilian population varied from area to area, some regarding the IDF favorably as an antidote to the violent anarchy that had plagued the small country since 1975. Here, an infantry column in M113s moves north. Although the stowage on the side of the vehicles is often attributed to Israel workshops, in fact some of the modifications to the basic M113A1 were carried out in the United States at FMC Corp. as part of an "Israeli Package" that was installed before delivery. (IGPO)

Lebanese children watch as an Israeli column advances into Lebanon in 1982. In the lead is a heavily stowed M113 Zelda, and behind it, an M60A1 Magach. (IGPO)



An IDF M113 which fell victim to a Palestinian RPG round near the refugee camp at Ein el-Hilwsh, 9 June 1982. The vehicle has been consumed by a severe internal fire. (IDF Spokesman)

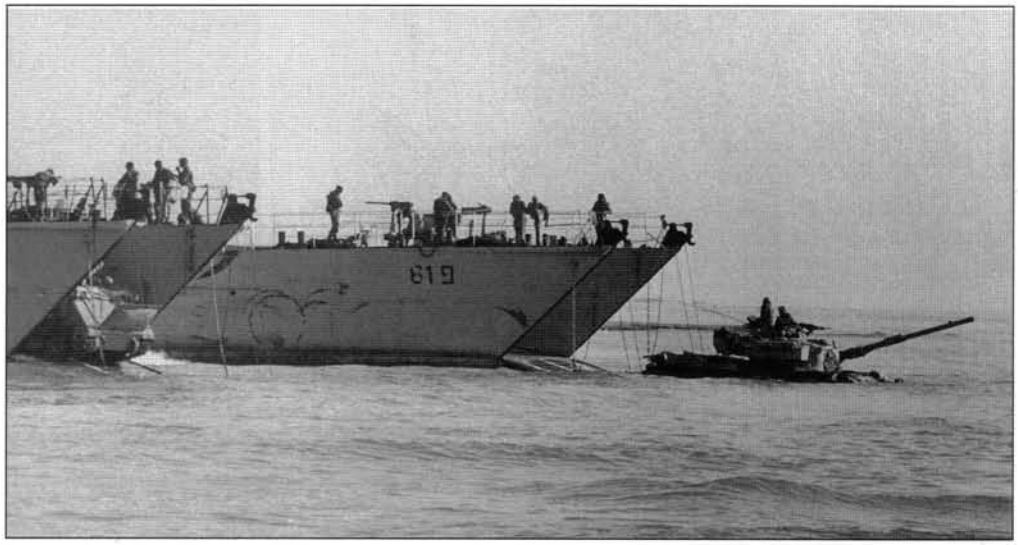
An IDF M113 Zelda configured as an ambulance with the red and white star-of-David, used instead of the Red Cross more familiar in Europe and the United States. (IGPO)

The destruction and desolation of Beirut is well evident in this photograph of an IDF paratrooper M113 racing through the southern neighborhoods of the Lebanese capital. The caution of the M113's crew is evident by the fact that their hands are on their machine gun's triggers, poised for immediate action. (IDF Spokesman)

A column of M113 Zelda APCs on the road leading into Beirut during the 1982 Lebanon operation. The small interior of the M113 means that crew gear is inevitably stowed on the outside of the vehicle. (IGPO)

Although obsolete as a front-line armored vehicle, this old M5 or M9 half-track was still in use in 1982, probably with an IDF reserve unit as a command vehicle. (IGPO)

Brig. Gen. Amos Yaron's Division 96 landed a portion of its forces north of the city of Tyre in an effort to surround the city and cut off any retreating Palestinian forces. Here an M113 Fitter's Vehicle of an Ordnance Corps unit comes ashore. This is a dedicated maintenance version of the M113 fitted with a small crane on the roof. (IGPO)



A Centurion Shot lands from a LCT near the Awali River on 7 June 1982 during the landings by Yaron's Division 96. This force was made up primarily by light infantry such as paratroopers, but had some armored support. (IGPO)

An IDF Navy landing craft unloads a force of M113 APCs during the large-scale amphibious landing at the Awali River tributary, 7 June 1982. Note the additional ammunition crates carried on the vehicle's exterior. (IDF Spokesman)

The M163A1 Vulcan antiaircraft system is a 20mm Gatling gun mounted on an M113 APC. During Israel's 1982 invasion of Lebanon the Air Force Vulcans were widely used to provide fire support during urban fighting due to their high elevation and the intimidating effect of their firepower. (IDF Spokesman)

Prior to the 1982 war, Israel received a significant number of M109A1 and M109A2 155mm self-propelled guns from the United States, modifying them into the standard Israeli M109AL configuration. This included the addition of large stowage bins on the turret front to contain the vehicle's camouflage netting. (IGPO)

A battery of M109AL self-propelled guns prepares to fire. These vehicles were widely used to support mechanized operations in the Bekaa Valley campaign in 1982. (IGPO)

An M109AL moves forward in the outskirts of Beirut in the summer of 1982. These vehicles frequently had a Browning .50 caliber heavy machine gun fitted above the gun tube to provide a measure of self-defense. (IGPO)

An artilleryman takes a break in an unlikely location during a lull in the fighting in Lebanon in 1982. The ammunition rounds in the foreground have not yet been fuzed. (IGPO)

The crewman of an M109AL, armed with a Galil assault rifle, looks for targets in the outskirts of Beirut in 1982. The M109AL was frequently used in direct-fire missions against targets too far away to be accurately engaged using tank fire. (IGPO)

The IDF captured a significant number of Soviet BM-24 multiple rocket launchers in the 1973 war, and put them into service afterwards. Here, a salvo of rockets is launched against PLO positions in Beirut. (IGPO)

The large 240mm rocket for the BM-24 is rammed into position in the hill country outside Beirut in 1982. (IGPO)

Two M109ALs hastily located in a firing position in southern Lebanon, prepare to fire a salvo against Palestinian fighters in the Nabatiyah area. The crewmen all wear flak vests and the now phased out version Type 601 helmets. (IDF Spokesman)

A typical look for Israel's M109AL self-propelled gun: covered by the crew's gear, sleeping bags, and anything else that can be fastened to its exterior. This vehicle commander wears a one-piece winter coverall, and carries a CAR-15 5.56mm carbine. (IDF Spokesman)

Responding to a Palestinian mortar attack, an Israeli M107 175mm gun battery responds with a burst of their own fire inside the south Lebanon security zone.

An M109AL battery prepares for operations against enemies along the coast in 1982. In the background is an old M3 half-track, frequently used as a command or support vehicle in artillery units. (IDF Spokesman)

Esh! Fire! A battery of M109ALs unloads a high-explosive volley against the Ein el-Hilweh refugee camp near Sidon during the second day of the war in Lebanon. Note battalion and company markings, identical to those used by the Armored Corps tanks and M113 armored personnel carriers. Also note orange aerial identification sheet draped over structure's top area. (IDF Spokesman)

During the Syrian evacuation from Beirut in August-September 1982, a T-55, camouflaged in the typical three-color camouflage scheme, departs slowly from the Lebanese capital. It is followed by a GAZ-66 truck carrying Palestinian fighters from the As-Saioa faction of the PLA.

A column of troops from the Syrian 85th Infantry Brigade withdraws from Beirut following the August 1982 agreement. The unit uses a selection of Soviet ZIL-157 trucks and lighter Unimogs. (Mohamed Assad)

IDF personnel police up the enormous amount of ordnance left abandoned in Lebanon in the wake of the 1982 war. Among the most popular weapons of the Muslim militias were gun trucks, usually consisting of a commandeered commercial truck with an antiaircraft gun mounted on the rear, in this case a quad 14.5mm ZPU-4. (IGPO)

During the IDF's re-deployment to lines closer to the Israeli frontier after the 1982 fighting, a force of M60A1 Magach tanks maneuver through the thin and winding roads. (IDF Spokesman)

IDF Modernization after Lebanon

The IDF armor brigades began to receive additional Merkava tanks after the 1982 war, including the improved Mk. 2 seen here. In total, there were about 400 Merkava tanks delivered to the IDF by the mid-1980s. (IDF Spokesman)

A Centurion Shot protected by panels of Blazer reactive armor plows through a field of thorny flowers in northern Israel. Note thermal sleeve for IMI produced 105mm main armament gun, forward mounted .50 caliber machine gun, and smoke grenade canister launcher. (IDF Spokesman)

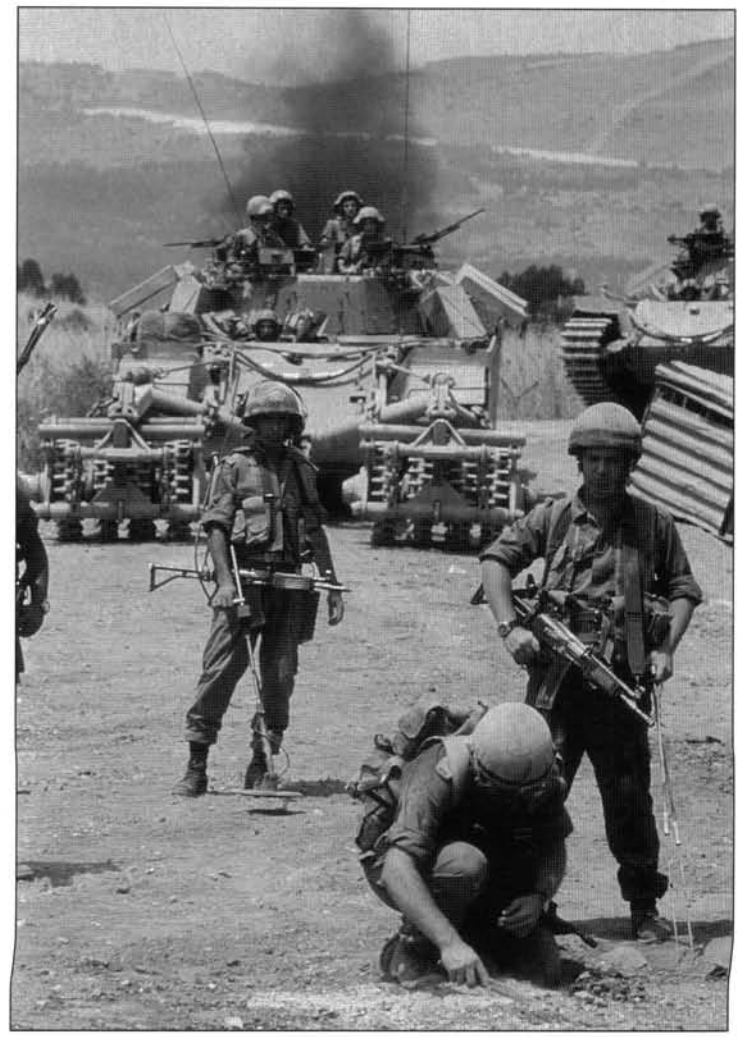
A modified Centurion Shot equipped with a mine roller prepares a path for advancing units during maneuvers in southern Israel. Note the ex-PLO T-34-85 tank in the background, captured in 1982 in Lebanon, now being used as a target. (Michael Giladi/IDF Spokesman)

A Centurion MBT provides some fire support to a squad of IDF infantrymen operating in the volatile northern frontier area opposite the Lebanese frontier following the 1982 war. (IDF Spokesman)

Two heavily modified Centurion Shots kick up a cloud of dust while racing through the Negev Desert during maneuvers in the mid-1980s. The Centurion gradually faded from service in regular IDF armor brigades as the IDF standardized on the M60 Magach and the new Merkava. (IDF Spokesman)

Under the cloudy cover on a winter's day in the Negev Desert, a *Handasah Kravit* (combat engineer) unit deploys from a Nagma Shot combat engineer's vehicle. This vehicle is a turret-less derivative of the Centurion tank, used to provide armored cover for combat engineer troops. These vehicles proved particularly useful in urban fighting in Lebanon. They are armed with 7.62mm FN MAG light machine guns. (Bamachane)

A rear view of the Nagma Shot shows how the Centurion hull has been re-engined. This view also illustrates the armored superstructure added over the former turret opening. (IDF Spokesman)



A squad of combat engineers search for anti-personnel and anti-vehicle land mines in the northern security area with a Nagma Shot equipped with anti-mine roller device following faithfully behind. (Bamachane)

An interesting side view of the Nagma Shot combat engineer vehicle. The large square devices on the side are light weight anti-mine shoes worn by combat engineers when traversing possible mine fields which spread out the engineer's weight to prevent the detonation of anti-personnel mines. (IDF Spokesman)

A Nagma Shot with its full complement of mine field breaching equipment including a mine field breaching charge trailer and a mine roller. This vehicle is on exercise in the rolling hills of northern Israel and anti-mine shoes can be seen on vehicle's sides. (IDF Spokesman)

In the early 1990s, the *Handasah Kravit* introduced a follow-on to the Nagma Shot, called the Puma. This vehicle is also based on the Centurion chassis, but offers better protection for the crew with a new generation of passive armor, and also provides more firepower in the form of an OWS (overhead weapon station) remotely operated machine gun. This Puma is on exercise in the Negev in February 1994. (Yves Debay)

This rear view of the Puma shows the significant differences from earlier Centurion engineer vehicles. The cut of the side panels over the suspension is reminiscent of the style on the Merkava. (Yves Debay)

A close-up of the Puma's superstructure roof shows the OWS in the foreground, and one of several FN MAG light machine guns that can be fitted to the roof. (Yves Debay)

A side view of a Puma on exercise in the Negev Desert in February 1994. The blue boxes on the rear fenders are anti-mine shoes. (Yves Debay)

A front view of a Puma on exercise with a *Handasah Kravit* combat engineer company in the Negev Desert. (Yves Debay)

A Magach on exercise after the war in southern Lebanon. This Magach is based on the earlier M60 chassis with the round early style turret. Most of these were rebuilt late in the decade into the Magach 7C configuration. (Jonathan Torgovnik/IDF Spokesman)

T-55 tank, 1st Armored Division, Syrian Army, Ein Zhalta, 1982

Although most Syrian 1st Armored Division tanks were finished in a camouflage pattern of sand and gray over Soviet dark green, this is an example of a tank that was left in its original delivery scheme of overall Soviet dark green. There is a three digit Arabic tactical number 452. The tank carries extensive white rectangular markings on the turret front, barrel, and fender fronts, which may have been a form of improvised marking to distinguish Syrian vehicles from Lebanese militia T-55s.

Merkava Mk. 1 tank, 211th Armored Brigade, Israeli Defense Forces, Lebanon, 1982

This Merkava is finished in the dark khaki drab introduced in the 1980s to replace the older gray drab color seen on IDF vehicles since the 1967 war. This coloring was adopted to better match the terrain of Lebanon and varies in color due to fading in the harsh sun of the region. The markings are the usual enigmatic IDF pattern consisting of the "spinning Vee" chevrons on the side skirt and turret indicating the 3rd Company, and the two white bands indicating the 2nd Battalion.

T-55 tank, 85th Brigade, Arab Deterrent Force, Syrian Army, Beirut, 1982

This T-55 is painted in the usual Syrian scheme of Soviet dark green with spray-painted light sand and medium gray splotches. The turret tactical number follows the pattern of the 1st Armored Division, with the numbers painted in a white box, suggesting that the tank may have come from a unit detached from the 1st Armored Division to support the 95th Brigade. The number in Arabic is 1/764. This vehicle carried the individual serial number 87432 on the bow in white six-inch high Arabic numbers.

Magach 6 (M60A1) tank, Armored Brigade, Israeli Defense Forces, Lebanon, 1982

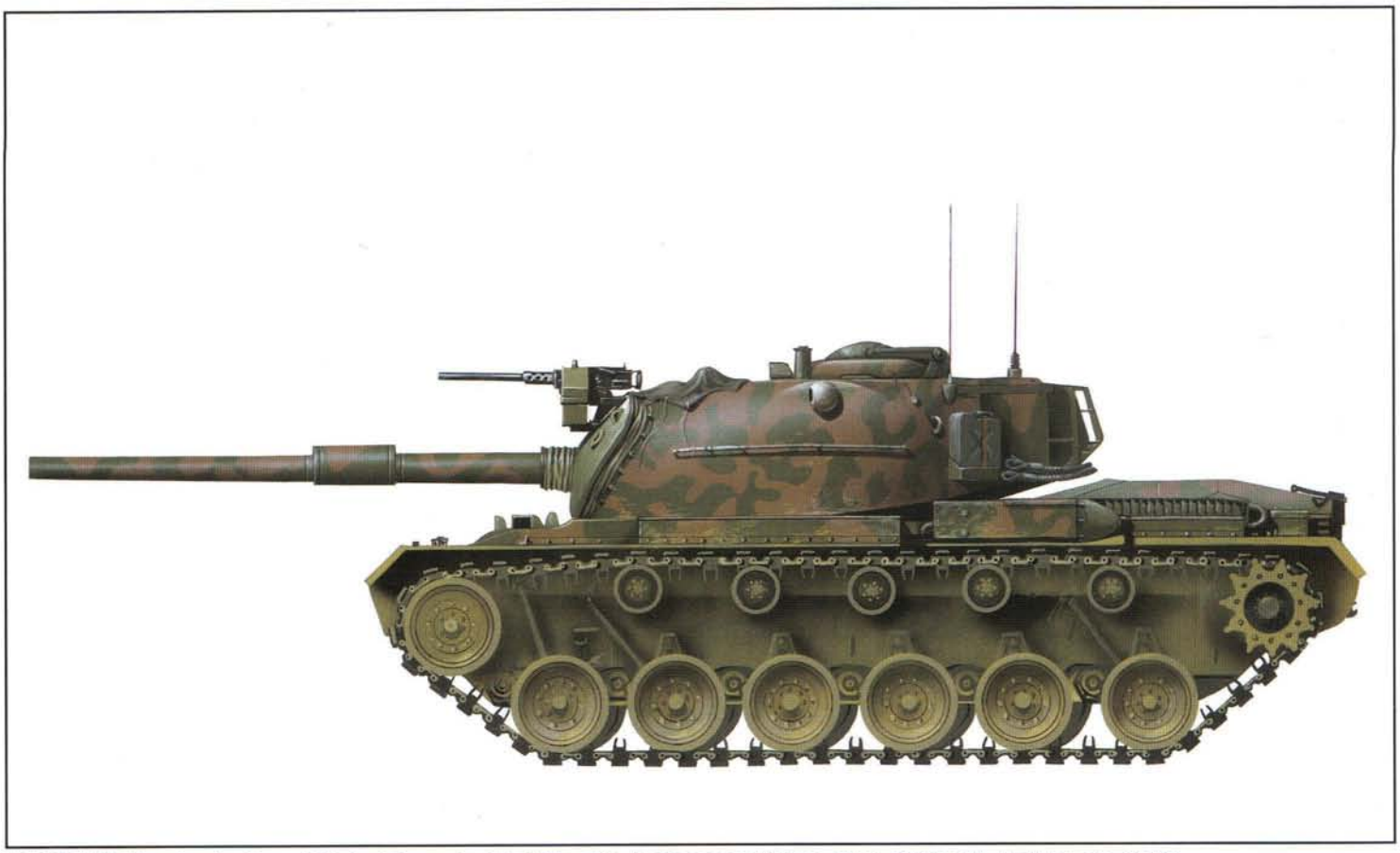
This Magach carries a canvas tactical panel on the turret side of a white 3 on a black background, not the more typical Hebrew vehicle letter. The three white barrel bands indicate the 3rd Battalion of the Brigade. An orange air recognition panel is carried on the top of the turret bustle.

T-62 tank, 1st Armored Division, Syrian Army, Ein Zhalta, Lebanon, 1982

Like most Syrian tanks of the 1st Armored Division, this T-62 is spray-painted with light sand and medium gray splotches over the usual Soviet dark green. The 1st Armored Division usually painted a three digit tactical number on the turret within a white box, in this case, 756. The 1st Armored Division also painted regimental insignia on their tanks in the form of a white rectangle with two geometric shapes, the color and pattern identifying the brigade, and battalion. However, photographs of the division's tanks are not clear enough to determine the insignia.

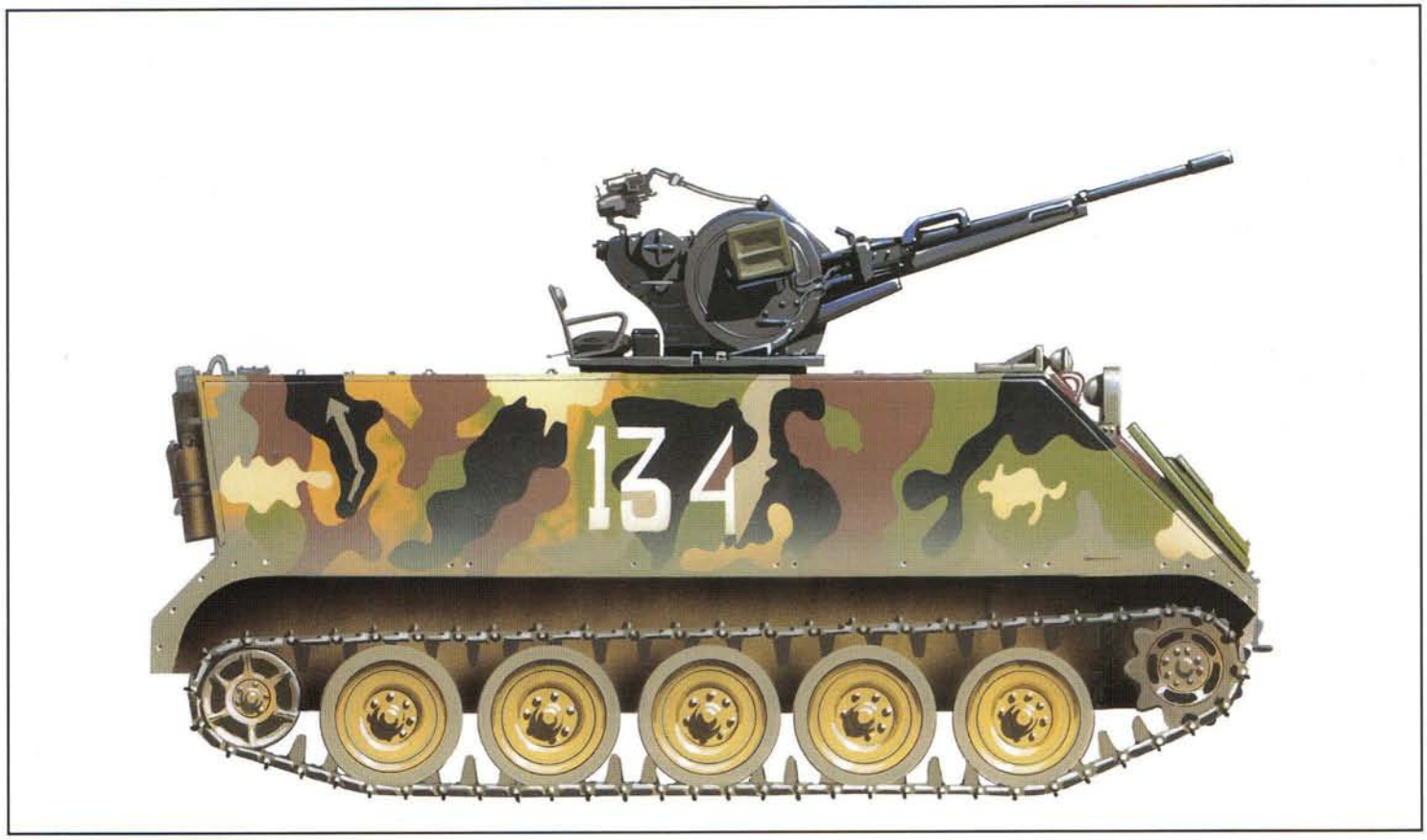
M109AL 155mm self-propelled gun, Artillery Regiment, Israeli Defense Forces, northern Israel, 1990

The IDF Artillery Force follows the marking patterns of the Armored Force, using a similar "spinning V" chevron system to indicate the firing battery. The chevron in this case is painted both on the turret side and on the wooden box carried on the turret bustle. The vehicle has three white bands on the barrel, including one on the bore-evacuator, with a name in Hebrew behind. This vehicle is painted in the usual IDF dark khaki drab.



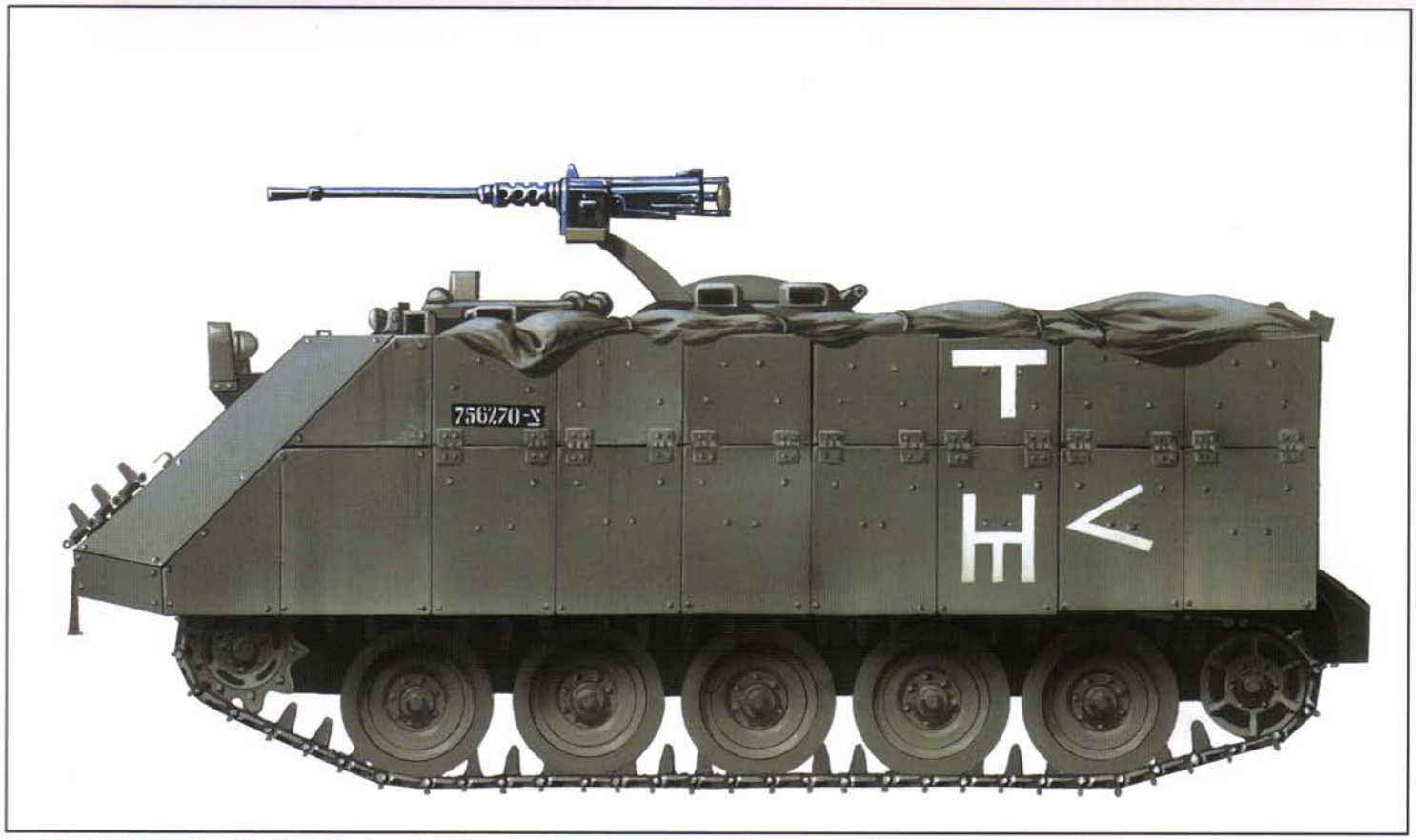
M48A5 Patton tank, Gen. Michel Aoun's 8th Brigade, Lebanese Army, Suq el Gharb, Lebanon, 1989

M48A5 tanks delivered from the US in the 1980s were painted in the standard forest green color, a very dark green. The Lebanese brigade has overpainted the turret and hull with a pattern of red brown, to more closely match the red clay soil of the area.



M113A1 with ZU-23 cannon, Gen. Michel Aoun's 8th Brigade, Lebanese Army, Beirut, 1989

The Lebanese Army occasionally painted their vehicles in elaborate camouflage patterns, in this case black, sand and brown over the usual forest green. This M113A1 has been modified by removing the commander's cupola, and mounting a ZU-23mm automatic cannon on top. This is not a simple field improvisation, as the ZU-23 caisson has been removed, and the turntable bolted to the roof- a modification requiring some technical skill.

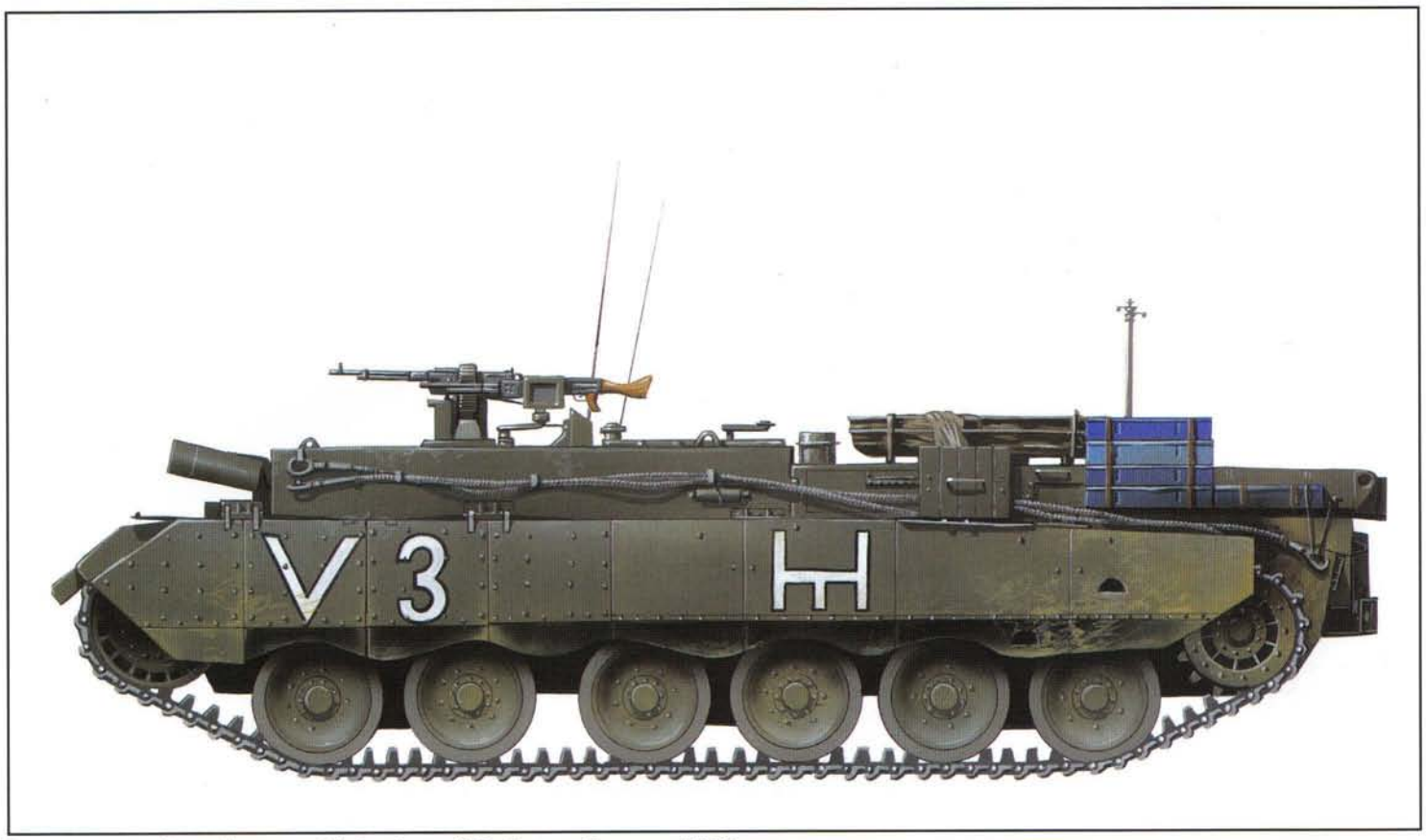


M113A1 Zelda, Mechanized Infantry Brigade, Israeli Defense Forces, southern Lebanon, 1992

This M113A1 with TOGA armor has the "spinning V" chevron of the 2nd Company. The other insignia in front of it seems to be associated with IDF assault engineer units. The vehicle serial number (756270 Ts) is painted in white on a black rectangle. This vehicle is painted in the usual IDF dark khaki drab.

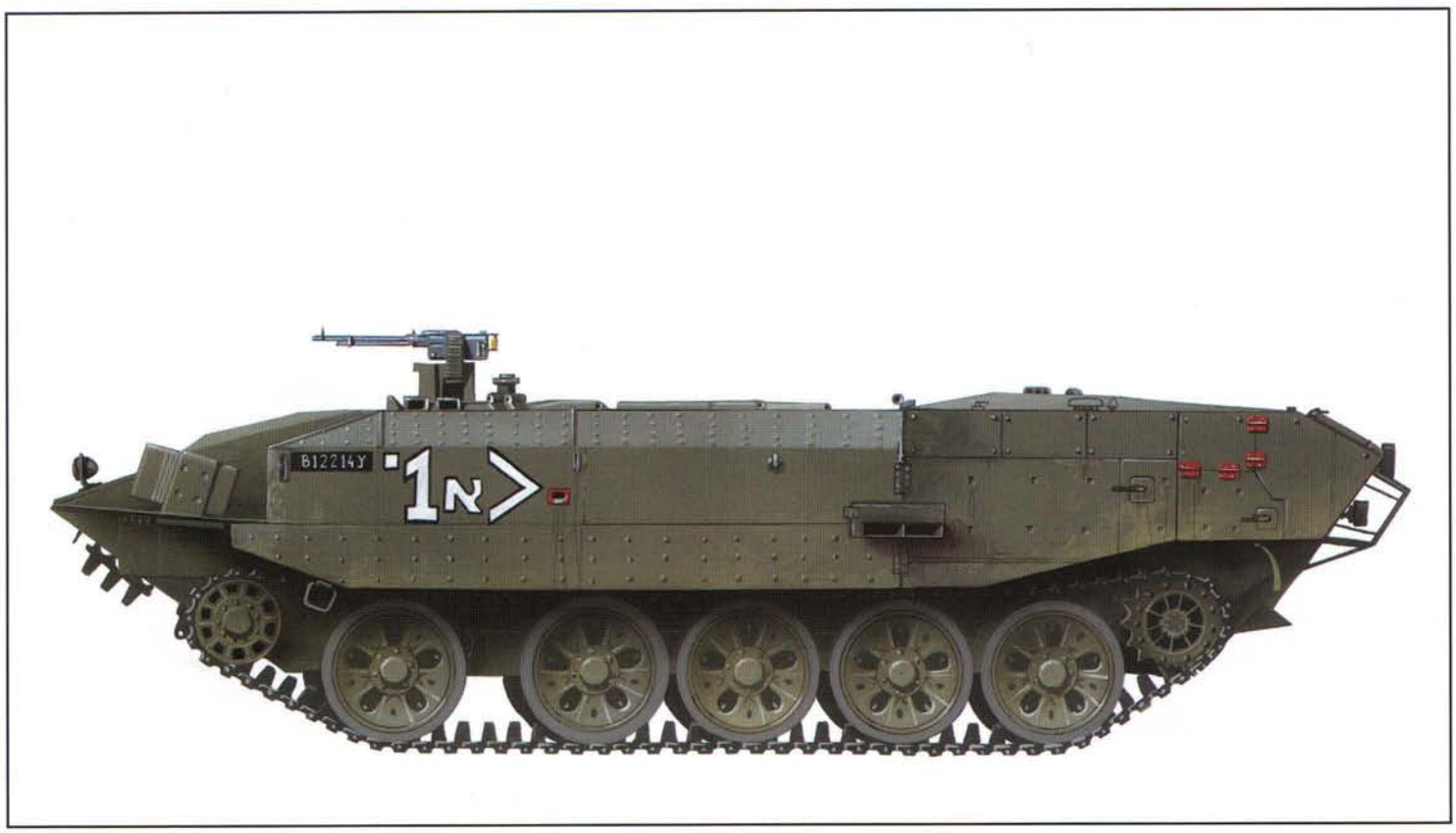
M113A1 Zelda, Mechanized Infantry Brigade, Israeli Defense Forces, southern Lebanon, 1992

This M113A1 with TOGA armor has the "spinning V" chevron of the 2nd Company, the Hebrew G for the fourth vehicle of the platoon, and the three small squares of the 3rd Battalion. The vehicle serial number (750478 Ts) is painted in the usual fashion in white numerals on a black rectangle. This vehicle is painted in the usual IDF dark khaki drab.



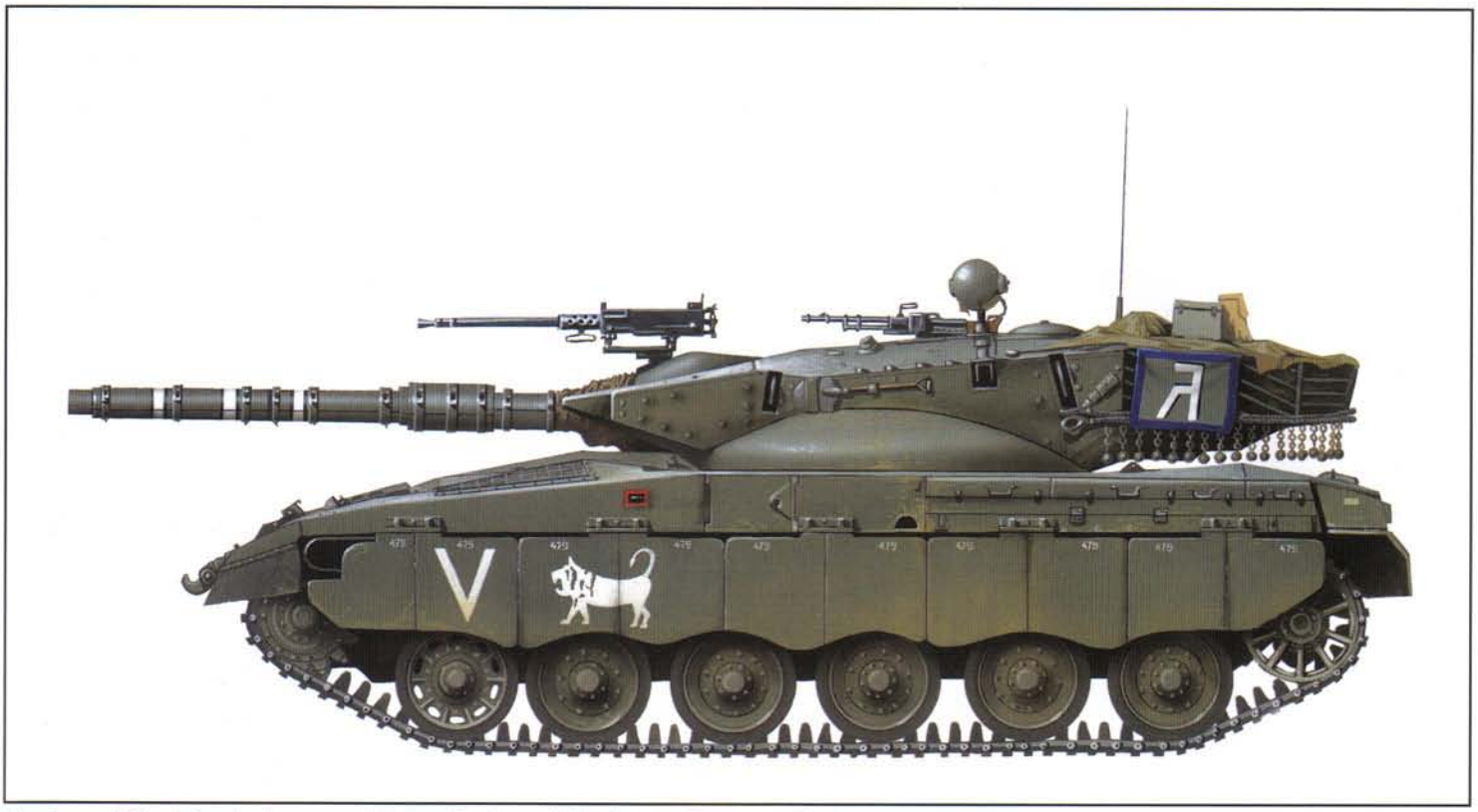
Puma assault engineer vehicle, Israeli Defense Forces, 1996

The Assault Engineers use the standard pattern of IDF markings including a 3rd Company "spinning Vee" chevron insignia, a vehicle number probably identifying the platoon, and a third tactical symbol on the rear. The lower flaps on the side skirt are left in the original black vinyl, and the anti-mine shoes on the rear are a medium blue. The vehicle is finished in the usual IDF dark khaki drab.



Achzarit heavy infantry assault vehicle, Armored Brigade, Israeli Defense Forces, 1996

This Achzarit carries the usual assortment of IDF tactical markings, the "1" indicating 1st platoon, the Aleph indicating the first vehicle, and the Chevron indicating the 4th Company. The single square indicates the 1st Battalion, and is an infantry substitute for the barrel bands on Israeli tanks. The vehicle production serial is painted on a black rectangle (812214), the final letter being the Hebrew letter "ts" from Tsahal, the Hebrew word for the IDF. The fire extinguisher is picked out in red for visibility, as are several access hinges on the perforated rear armor plate. The color scheme is the usual Israeli khaki drab.



Merkava Mk. 2 tank, Armored Brigade, Israeli Defense Forces, 1992

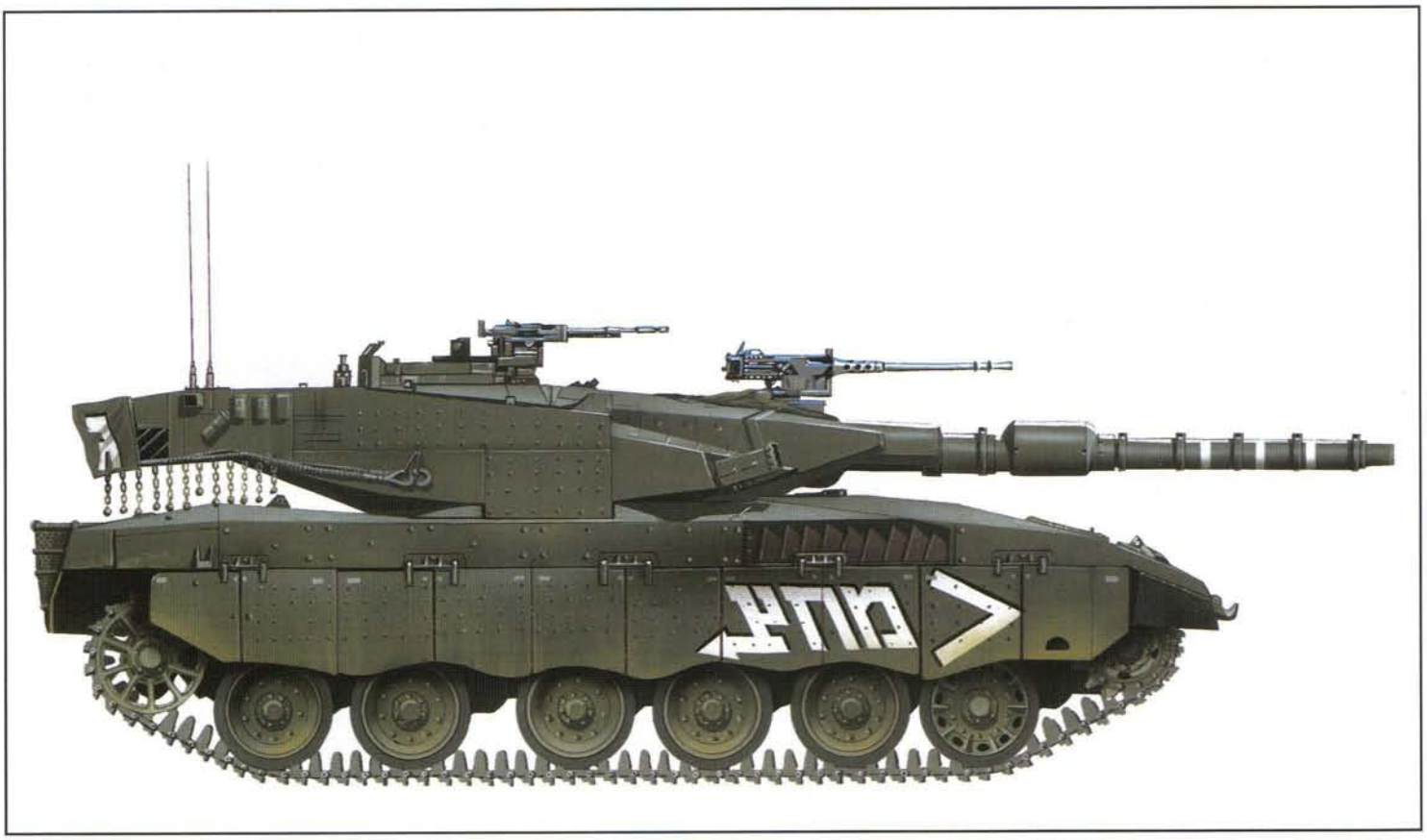
This Merkava is typical of the more elaborately marked IDF vehicles of the early 1990s when security restrictions were relaxed to permit more elaborate insignia for unit morale. The "spinning Vee" tactical chevron for the 3rd Company is evident on the front side skirts, followed by a lion silhouette. Each of the side skirt panels is marked with the three-digit vehicle number to avoid switching panels when the suspension is periodically serviced. The tank's removable tactical panel on the bustle carries the Hebrew letter "G" for the fourth tank in the platoon. The three white barrel stripes indicate the 3rd Battalion of the Brigade. The area around the fire extinguisher handle is picked out in red. The color scheme is the usual Israeli khaki drab.

Merkava Mk. 2 tank, Armored Brigade, Israeli Defense Forces, 1992

In the early 1990s, Israeli armored brigades permitted their crews to paint unit nicknames on their vehicles, in this case on the side skirts after the 3rd Company "spinning Vee" chevron insignia, and sometimes repeated on a canvas panel at the turret rear. The tactical panel on the bustle is the Hebrew letter G, indicating the fourth tank of the platoon. The new "digital" style of stenciling is evident on the side skirt panels and on the side stowage doors. These are numbered to make certain that the panels return to the proper tank when maintenance is undertaken.

Magach 7C tank, Armored Brigade, Israeli Defense Forces, Galilee, Israel, 1994

This Magach carries the 3rd Company "spinning Vee" chevron insignia on the turret side, followed by the tactical panel V1, apparently indicating the second tank of the 1st platoon. The three white barrel rings indicate the brigade's third battalion. This tank is finished in the usual dark khaki drab seen on Israeli tanks since the 1980s.



Merkava Mk. 3 tank, 188th Armored Brigade, Israeli Defense Forces, 1995

This tank is named *Mahatz* (Strike), apparently the codename for the 3rd Battalion of the 188th Armored Brigade. The chevron insignia indicates the 2nd Company, and the tactical panel on the bustle is the Hebrew letter G for the fourth vehicle in the platoon. The barrel carries three white stripes, and also has a white stripe painted along the top of the barrel. This tank is finished in the usual dark khaki drab seen on Israeli tanks since the 1980s.

A Magach 6 based on the M60 with mine clearing roller and the new Israel Military Industries 105mm gun fitted with a Vidco thermal sleeve. (IDF Spokesman)

The Magach underwent continual improvements through the 1980s. On the Magach 6A, the US rubber block track has been replaced by the metal track from the Merkava which is more durable in rocky terrain. This vehicle has also been retrofitted with the Vidco thermal sleeve on its gun barrel.

When thinking about Israeli tanks, one does not immediately think of snow! Here, a Magach 6 covered by a blanket of snow conducts a security patrol around the Mt. Hermon position in northern Israel. (Jonathan Torgovnik/IDF Spokesman)

Protecting an advancing column of M113 APCs, a modified Magach 6 crosses a small bridge courtesy of IDF combat engineers. This tank is a Magach 6B Gal [Wave], named after the new fire control system onboard. This version has other upgrades, including the Merkava track, the Vidco thermal sleeve, and the IMI CL-3030 self-screening smoke grenade system on the front of the turret. (Jonathan Torgovnik/IDF Spokesman)

An interesting detail view of a Magach commander dropping a 60mm round into the 60mm mortar mounted within arm's length of the commander's cupola. Note elevation system for mortar. (Bamachane)

A Magach nicknamed "Chulit ["Sand Hill"] on the back of the turret which has recently hit an old Egyptian T-34-85 used for live-fire range practice. The practice of naming vehicles with sanctioned graffiti is a new phenomenon. (Michael Zarfati/Bamachane)

Excellent frontal view of the mine-clearing rolling device attached to the hull of a Magach 6 showing the device's configuration and attachment. The tank's name on the right mud guard is "Saara" ["Storm"]. (Shmuel Rachmani/Bamachane)

A Magach 6 fitted with mine-clearing rollers plows a safe passage route for a force of M113 APCs in the Negev Desert. (Chanoch Gutman/Bamachane)

An infantry officer radios in the position of his force's Magach 6 during maneuvers. This is an older Magach configuration with the American rubber block track and original unshielded gun tube. (Jonathan Torgovnik/IDF Spokesman)

This is a good illustration of the features of the Magach 6B Gal including the use of the Vidco thermal sleeve on the gun, the Merkava steel tracks, the new boxed smoke grenade launcher system, and other upgrades. (IDF Spokesman)

As a Magach with mine rollers passes by, a force of paratroopers provide cover fire with their Galil and Gillon 5.56mm automatic rifles; note the rifle grenades carried in back packs. Note the loader sitting upright in "recliner chair" seat atop turret, a common feature on Israeli Magach tanks during peacetime exercises. (Jonathan Torgovnik/IDF Spokesman)

During infantry assault exercises in southern Israel, a combined force of Golani infantrymen and Magach 6B Gal tanks stalk enemy positions. (Bamachane)

A Magach 6B on exercise. This vehicle is still fitted with the old rubber block tracks, but has the new enlarged stowage bin fitted to the rear. (Eyal Bar-Lev/IDF Spokesman)

A close-up view of a modified Magach commander's station with its Urdan cupola and commander's FN MAG 7.62mm light machine gun. Also evident are the 60mm mortar to his lower right and the war-game flashing light to his left on the turret roof. (Eyal Bar-Lev/IDF Spokesman)

An impressive force of Magach 7C tanks kick up the desert floor during large-scale maneuvers in southern Israel with elements of the Givaati Infantry Brigade. (Michael Vinraub/IDF Spokesman)

Its treads and wheels caked in dried mud, a Magach 6B Gal moves through the winding sand dunes of the Negev Desert. The turret has been substantially modified over the years, including Elbit computer and fire control and laser rangefinder. The canvas strapping running across the Blazer ERA panels is in fact the sensor strip for a laser training system. (Eyal Bar-Lev/IDF Spokesman)

A company of Magach 7C tanks advances through a desert trail during large-scale maneuvers in the Negev Desert. This version of the Magach series also incorporates an engine upgrade, booting its power to 900 horsepower. (Michael Vinraub/IDF Spokesman)

An excellent side-view of the new Magach 7C shows the slab-sided laminate armored design to advantage. Also evident are the smoke grenade canister launchers positioned on the turret sides and the xenon searchlight positioned above 105mm main gun. (Ofer Lefler/IDF Spokesman)

Another view of the Magach 7C showing the attachment for mine rollers. The armor on the Magach 7 is a passive laminate similar to the Chobham armor used on current European main battle tanks. (Ofer Lefler/IDF Spokesman)

Rear view of the Magach 7C. The "digital" style vehicle serial number has been used on some Israeli tanks since the early 1990s. The right fender contains what appears to be (left to right): the divisional insignia, the battalion number, and the brigade insignia. The large turret letter-number sets indicate the vehicle's position in the company and platoon. (Ofer Lefler/IDF Spokesman)

A paratroop NCO tosses a smoke grenade to prepare the screening cover while a Magach 7C prepares to advance. (Sivan Farac/IDF Spokesman)

When originally delivered to the *Heyl Ha'Tochanim* (Artillery Force) from the United States, these M109AL self-propelled howitzers differed little from their American counterparts.

An M109AL nicknamed "Granite" patrols the high ground of northern Israel overlooking the treacherous south Lebanese frontier. "Granite" is stenciled on the 155mm gun's bore evacuator.

An M109AL, following a fresh painting, is readied for action during battle exercises. Although artillery are usually deployed behind the front lines, the *Heyl Ha'Tochanim* have been trained intensively for direct fire roles as in Lebanon, M109AL vehicles fought in the vanguard during urban combat.

An M109AL battery, this one made up of reservists, responds in kind to Hizbollah rocket attacks against forward positions of the pro-Israeli South Lebanese Army (SLA).

At a northern border position overlooking a section of southern Lebanon, an M109AL observes the going-on over the frontier. The storage bins have unit marking placards affixed. The vehicle's name, "Granite", is stenciled on the barrel of its 155mm gun.

A pair of M113 Zelda infantry carriers moves forward on exercise while a Hughes 500MD Defender skims over. The Defender proved to be a successful tank hunter over Lebanon in 1982. (IDF Spokesman)

An M163 Vulcan nicknamed "Gun" maintains a vigil inside southern Lebanon: its 20mm Gatling gun aimed at the skies in search of hostilities which might include Syrian aircraft, or Palestinian hang gliders and balloons en route to Galilee. More often than not, Air Force Vulcans have been used against ground targets due to the absence of aerial adversaries. (Bison Hevl Ha'Avir)

An excellent view of an IAF M163, seen here with overflowing crew storage racks for personal equipment, covered with battalion and company station markings. The vehicle's name, "Gunni" is stenciled on the engine access panel. (IDF Spokesman)

A paratrooper M113 Mapats/TOW system on the training grounds of southern Israel. The basic M220 TOW mount has been modified to fire the laser guided Mapats missile. This type of missile-armed tank destroyer has enabled paratroop units to fend off an armored attack without having to call in IAF or other armor units.

Low altitude air defense of IDF mechanized columns is provided by Air Force M48A1 Chaparral units. The Chaparral is a surface launcher version of the highly successful Sidewinder dogfight missile.

An IAF NCO proudly stands by "his" Chaparral during maneuvers in northern Israel. As indicated by the Syrian roundel on the launcher, this vehicle was credited with downing a Syrian MiG-23 during the Lebanon War.

The most potent battlefield artillery weapon in Israeli service is the MGM-52 Lance. It is not clear if Israel Lances are fitted with nuclear warheads, but there is a good probability that this is the case. During large-scale maneuvers in southern Israel meant to simulate full-scale war, a Lance battery sets up. Evident are two of the standard M752 transporter/launcher vehicle and the resupply transporter truck. The launcher assembly can be towed out of the launcher for loading.

An Artillery Corps crew prepare an MGM-52 Lance surface-to-surface ballistic missile, using the crane on the M688 Loader-Transporter to move it to the M752 launcher vehicle. The Lance missiles, because of their nuclear potential, are rarely discussed or displayed inside Israel.

Embedded in the unforgiving mud of a sudden spring's storm in southern Lebanon, a young M107 self-propelled gun commander observes as his vehicle is prepared into a dug-in firing position. He is armed with a CAR-15 carbine, a standard self-defense weapon for IDF vehicle crews.

In the attempt to avoid relying on antiquated systems captured in previous wars, Israel Military Industries (IMI) came up with its own rocket launcher system, the LAR-160. This 20 round launcher could be mounted on a semi-trailer as seen here, or on an armored vehicle chassis. Few of these systems were deployed, and in the mid-1990s, the IDF decided instead to purchase the US MLRS multiple launch rocket system.

The Lebanese Forces

An M113A1 of the 5th Brigade of the Lebanese Army in Sidon in 1989. The vehicle is in its original US color scheme, but a Lebanese Army license plate has been painted on the glacis, and the brigade insignia on the hull side. (Mohamed Assad)

One of the most typical weapons in the civil war in Beirut was armed trucks. This is a Toyota Land Cruiser of the Popular Liberation Army, armed with a B-10 82mm recoilless rifle. (Mohamed Assad)

In the late 1980s, there was an effort made to reestablish national control over the militias, and the Lebanese Army was reestablished. Here, the Lebanese Army 9th Brigade is deployed in Sidon with a Panhard M-3 VTT wheeled APC to the left and a Panhard AML-90 on the right. At least 52 AML-90s were delivered to Lebanon in 1970-72 along with 60 of the M-3 VTT. The 6th Brigade was equipped mainly with T-55 tanks and the 10th Brigade with M48A5 Patton tanks. (Mohamed Assad)

Fighting broke out between the Lebanese Army and the PLO around Sidon in 1989. This is an M113A1 of the 9th Brigade, and its troops man a confiscated civilian jeep. (Mohamed Assad)

During the fighting in the late 1980s, Iraq joined the fray by shipping large quantities of equipment to militias opposing their arch rival, the Syrians. This consisted primarily of T-55 tanks as well as seven 2S4 Tyulpan 240mm self-propelled mortars. This ex-Iraqi T-55 was captured by the Lebanese Army and operated with the 7th Brigade. It is finished in a camouflage scheme of pale sand with patches of dark gray. (Mohamed Assad)

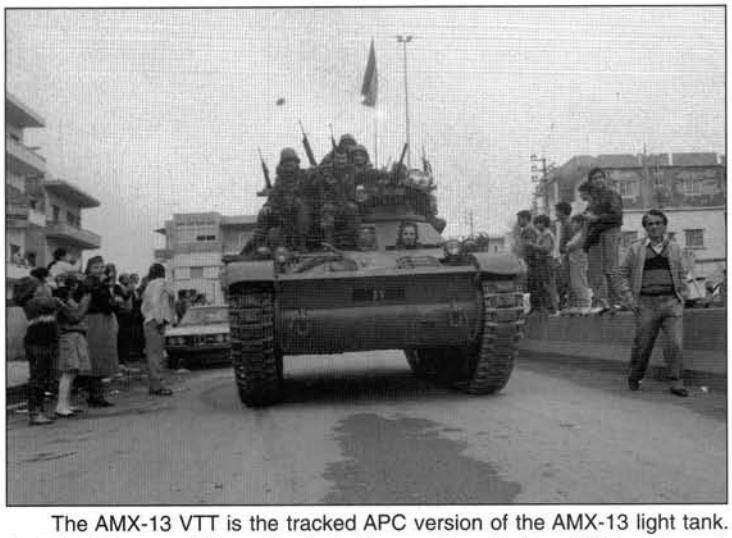
The Lebanese Forces were provided with a number of M88 recovery vehicles, this one serving with the Phalangist militia. (Mohamed Assad)

The M113A1 was often used as a heavy weapons carrier by the Lebanese Army, like this example from the 5th Brigade that has had a Soviet ZU-23 anti-aircraft gun mounted on the roof. The gun itself has been modified by the addition of armored shields on the front. (Mohamed Assad)

A VAB wheeled APC of the Lebanese Army in Sidon during the 1989 fighting with the PLO. The tactical insignia on the hull side is the Arabic number 6 painted on a white circle which is apparently a local equivalent of the yellow NATO pattern bridge weight marking. A total of 90 of VAB were delivered by France in 1983-84. (Mohamed Assad)

Saladin armored cars like this one were delivered in 1978 to the Lebanese Army as surplus aid, but they were gradually taken over by the militias in the civil war. A total of 18 were sent, along with 18 Saracens. (Mohamed Assad)

Besides the FV601 Saladins, there were also FV603 Saracen wheeled APCs delivered in 1978 to the Lebanese Army. Many were later used by the Amal militia in West Beirut. (Mohamed Assad)



The AMX-13 VTT is the tracked APC version of the AMX-13 light tank. A total of 30 were delivered to the Lebanese Army in May 1984, and one is seen here entering Sidon shortly after the withdrawal of the IDF in 1985. (Mohamed Assad)

The South Lebanon Army continued to receive equipment from the IDF after the 1982 war. This is an M113A1 modified to include the new TOGA appliqué armor package. This armor is designed to lessen the effect of RPG-7s. (Mohamed Assad)

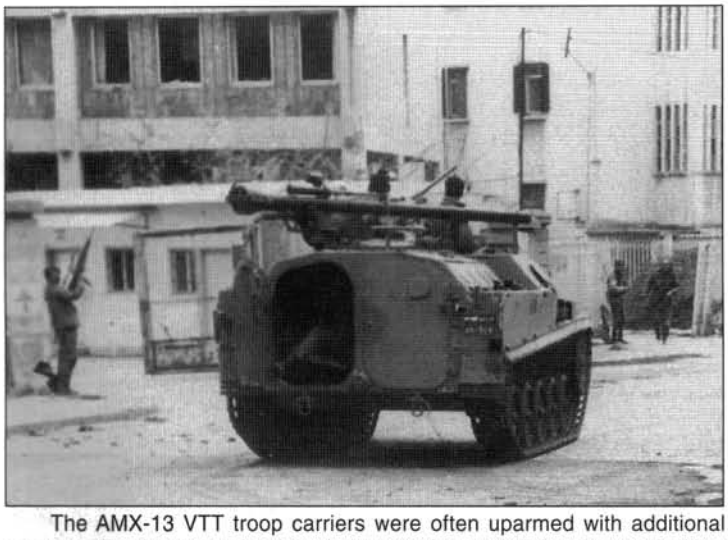
The South Lebanon Army (SLA) often received cast-off equipment from the IDF, such as the T-55 tank. This T-55 tank has been modified by the Israelis with the incorporation of additional external stowage, Israeli tactical radios, and other features. (Mohamed Assad)

Another example of the Israeli modified T-55s in SLA service in the border security zone. This view more clearly shows the large stowage bins welded to the rear of the T-55 turret. They were originally finished in Israeli sand-gray, but the Lebanese painted dark green bands on them to distinguish them from IDF vehicles. They were later painted overall medium gray as were most SLA vehicles. (Mohamed Assad)

Another former Israeli vehicle used by the Lebanese Forces was the M-50, an upgraded version of the old US M4A1 Sherman tank. This photo was taken during a skirmish between rival factions of the same militia, led by the dueling Elie Houbaika and Samir Geagea. Geagea eventually emerged victorious and controlled eastern Beirut for a time. During the fighting, his fighters wore white headbands as seen here to distinguish themselves from their rivals. (Mohamed Assad)

The Lebanese Forces operated a wide range of equipment, including this M113A1 during their ill-starred attempt to wrest control of Sidon from the PLO and other forces in 1985. Their insignia was the orange "Resistance Cross" seen painted on the bow plane of the vehicle. (Mohamed Assad)

Some of the militias captured armored police and bank security vehicles, like this damaged UR-416 being towed through Sidon by the Lebanese Forces. (Mohamed Assad)



The AMX-13 VTT troop carriers were often uparmed with additional weapons like this example of the Lebanese Army 7th Brigade armed with a US 106mm recoilless rifle during the fighting in eastern Beirut in February 1990. (Mohamed Assad)

A Lebanese Army M113A1 of the 8th Brigade armed with a Soviet ZU-23 23mm automatic cannon knocked out by an anti-tank rocket during the fighting in 1990 to reestablish national control over eastern Beirut. The impact point of the rocket is clearly visible. (Mohamed Assad)

During the 1990 fighting in eastern Beirut, the Lebanese Army was allied to the Syrian Army. In this view, a Lebanese Army M113A1 armed with a 14.5mm ZPU-1 stands near a Syrian T-55 in front of the Presidential Palace. (Mohamed Assad)

A Lebanese Army Special Forces company moves down a road near Beirut in September 1989. The vehicle is armed with a Soviet twin 14.5mm KPVT heavy machine gun mount called the ZPU-2. (Yves Debay)

Two VAB APCs carrying a unit of Lebanese Army Special Forces commandos return from an engagement with Syrian forces near Beirut. The commandos wear U.S. woodland pattern camouflage fatigues, Israeli Enhod web gear, and their usual red beret. (Yves Debay)

Lebanese Special Forces commandos are equipped with diverse equipment including this Panhard AML-90 armored car. Note the Lebanese Army Special Forces Brigade emblem painted on the vehicle's turret. (Yves Debay)

Lebanese Special Forces commandos ride outside the VAB, in part due to concern over the mine threat. In the Mid-East, many experienced troops ride outside armored personnel carriers due to the devastating consequences of riding inside when the vehicle strikes a mine. (Yves Debay)

A Lebanese Army Special Forces VAB in 1989 with an improvised camouflage of medium brown painted over the usual French Army green. The yellow bridging circle with the number 14 is a left-over NATO marking when the vehicle was originally supplied from France. (Yves Debay)

An M113A1 belonging to a commando unit of General Michel Aoun's command brigade patrols the streets of Rouhneih. It is armed with the common Soviet-produced ZU-23 twin 23mm automatic cannon. (Yves Debay)

An AMX-13 light tank of the Lebanese Army 8th Brigade is sheltered from outside view in the deserted shell of a three-story family dwelling in Suq el Gharb. (Yves Debay)

An M113A1 APC armed with a ZPU-4 14.5mm quad heavy machine gun belonging to the Lebanese Army in Beirut. (Yves Debay)

A camouflaged M113 belonging to the Lebanese Army's 10th Heliborne Brigade moves through the ruins of Suq el Gharb. The camouflage is black, brown and sand over the usual dark forest green. (Yves Debay)

Close-up view of the Lebanese Army AMX VCI tracked APC belonging to the 5th Brigade. Note the trooper wearing a "General Aoun T-Shirt." (Yves Debay)

A French-built Panhard AML-90 armored car of General Michel Aoun's 5th Brigade patrols Christian East Beirut in September 1989. (Yves Debay)

A 5th Brigade Panhard M-3 VTT APC patrols an East Beirut side-street against Syrian commandos. Note Lebanese flags and photograph of General Aoun on vehicle's front. (Yves Debay)

An AMX-13 VCI in the streets of East Beirut, belonging to the Lebanese Army 5th Brigade. (Yves Debay)

A Panhard AML-90 armored car in search of possible "enemy" activity in the port area of Beirut: a valuable lifeline of the Christian half of the city. (Yves Debay)

An M48A5 Patton tank of the Lebanese Army's Christian 8th Brigade under the control of General Michel Aoun slowly patrols a precarious stretch of road near the Shouf Mountain hamlet of Suq el Gharb in September 1989. A total of 102 of these tanks were supplied by the United States in 1983 as part of an attempt to bolster the fragile Lebanese government in the wake of the 1982 war. (Yves Debay)

In perfect ambush country, an M48A5 Patton of the Lebanese Army grinds through the Shouf hills. The loader wears a flak vest and civilian T-shirt and commander wears American-supplied woodland pattern camouflage fatigues. This version of the M48 is armed with a 105mm gun compared to the 90mm gun used on earlier variants. (Yves Debay)

An 8th Brigade gunner mans a Soviet-produced ZU-23 23mm dual automatic cannon mounted on an American-supplied M113A1 APC. Note camouflage scheme meant to copy woodland pattern camouflage fatigues worn by many Lebanese factions, including the conventional Lebanese military. (Yves Debay)

An M113A1 of the Lebanese Army's (Christian) 10th Heliborne Brigade, allied with General Aoun, is hidden from Syrian reconnaissance patrols during the battle for Beirut in 1989. This vehicle is fitted with the ACAV armor kit around the roof machine guns. The 10th Brigade insignia is painted on the forward side of the hull. (Yves Debay)

The ruined backdrop of the Shouf hills leading up to Suq el Gharb demonstrates the devastation of fifteen years of civil war as an M48A5 tank passes through. (Yves Debay)

The 10th Heliborne Brigade owed much of its success to its ability to manipulate the friendly confines of East Beirut to their maximum advantage: including this parking lot beneath a four star hotel which, before the civil war, was one of the grandest in all Lebanon. (Yves Debay)

Having deployed from an M113A1, a MILAN anti-tank missile crew from the Lebanese Army's 8th Brigade prepares to fire at a Syrian BMP-1 in the shell-cratered confines of a Suq el Gharb street. The Milan was first widely used in the 1982 fighting, and proved to be a very lethal weapon against the relatively thinly armored vehicles operated by all factions. (Yves Debay)

The most widely used anti-tank weapon of the Lebanese civil war was the RPG-7 rocket grenade. A Lebanese Army RPG gunner, wearing an Israeli flak vest and American-supplied woodland pattern BDUs, prepares to fire his RPG-7 at the lead BTR-60 of a Syrian Army convoy at Suq el Gharb during the fighting in Beirut in 1989. (Yves Debay)

A 10th Brigade M113A1 equipped with a turret mounted .50 caliber heavy machine gun emerges from the weeds of a Baabda field and into position to engage Syrian commandos deployed around Beirut. Note brigade insignia painted on the side. (Yves Debay)

A close-up of the turret roof of a Christian Phalangist M48A5 tank: the commander and crewman's ballistic helmets are American, their Kevlar flak vests and uniforms are Israeli, and their vehicle was captured from the Lebanese Army. Turret armament includes a .50 caliber heavy machine gun flanked by two M-60 7.62mm light machine guns. (Yves Debay)

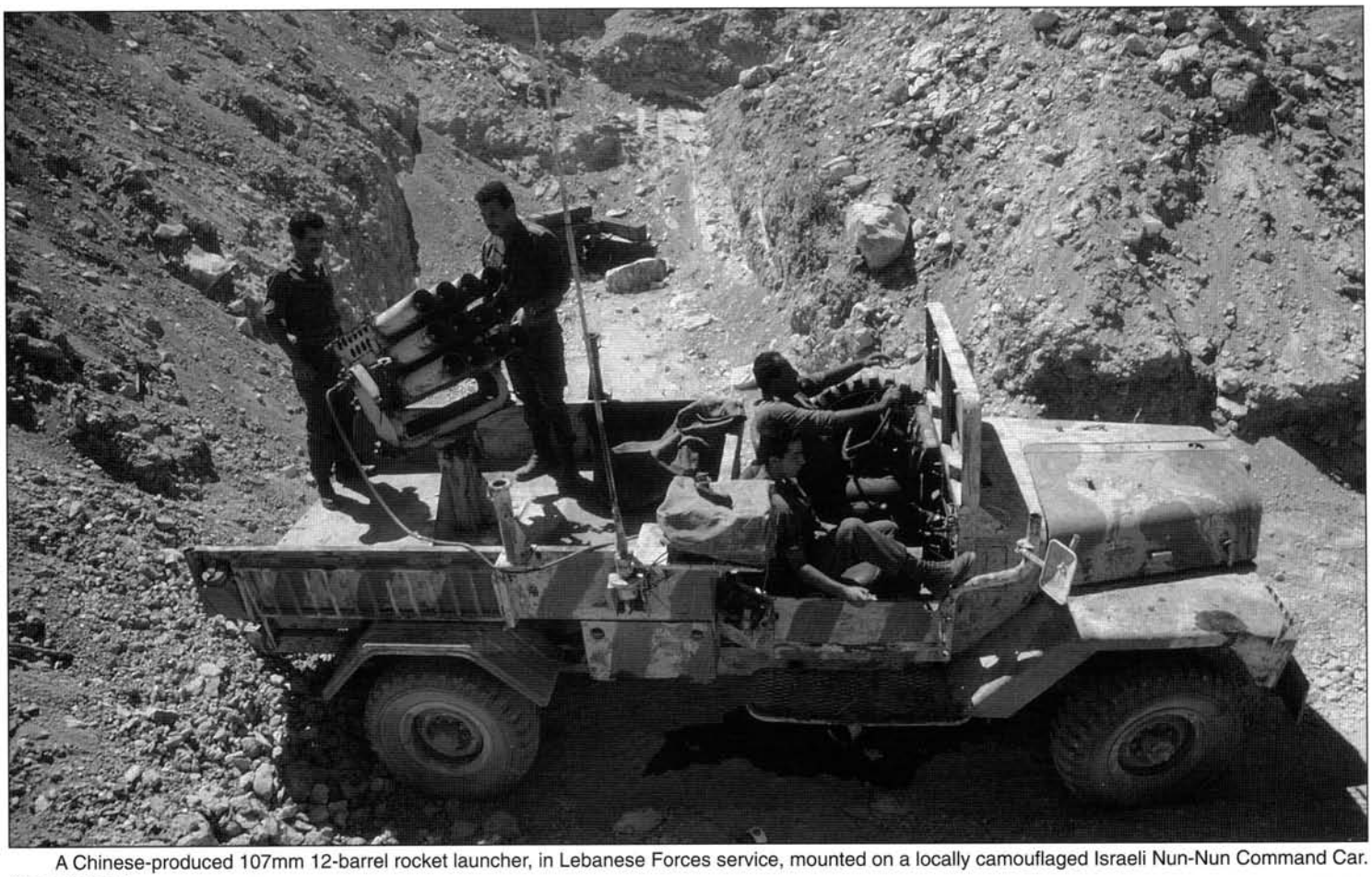
A Phalangist M48A5 tank searches the barren hills for the enemies. Not surprisingly, fratricide is a common worry as both the Lebanese Army and the Phalangist militia were both operating M48A5 tanks in 1989. (Yves Debay)

A Christian Phalangist Lebanese Forces T-54A adorned in a camouflage scheme meant to copy the woodland pattern on the American BDU combat fatigues. The tank was supplied to the Lebanese Forces by Saddam Hussein in a large-scale supply of arms and material meant to fan the flames of conflict against Iraq's principal adversary in the Arab world, the Syrians. Other weapons supplied by Baghdad to Christian East Beirut also included heavy artillery, such as 155mm guns, and batteries of Luna-M (FROG-7) artillery rockets. (Yves Debay)

Close-up view of an Iraqi-supplied Lebanese Forces T-55 tank, stationed on an East Beirut side-street, during a lull in the factional fighting. Note American-made .30 caliber and .50 caliber heavy machine guns mounted atop turret, and the AK-47 7.62mm assault rifle strung to commander's hatch. (Yves Debay)

The crew of an Iraqi-supplied T-55 tank with the Lebanese Forces in Beirut in September 1989. (Yves Debay)

A T-54A tank of the Lebanese Forces supplied by the Iraqis, moves out from a staging area closer to the Green Line frontier during fighting in September 1989. (Yves Debay)

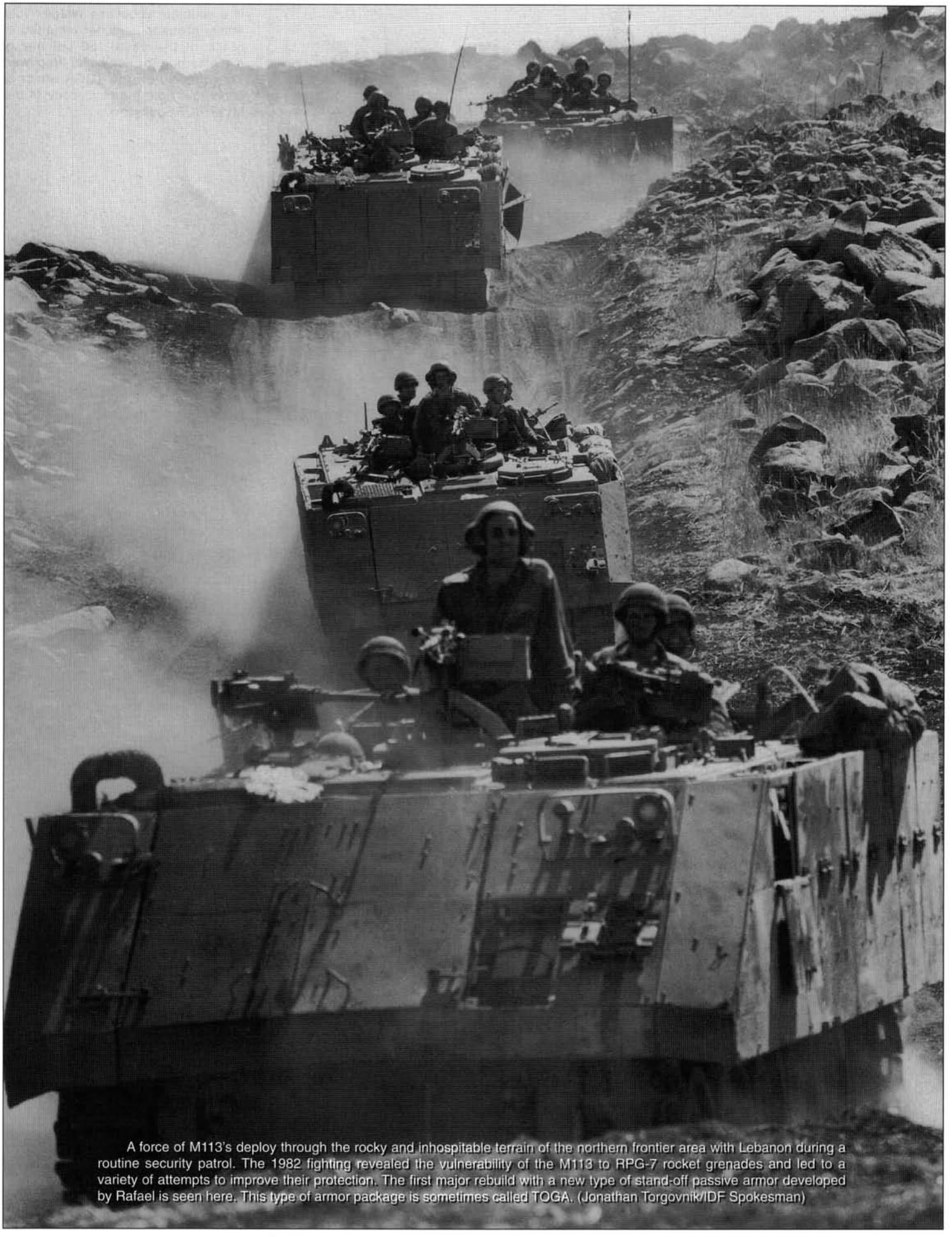


A Chinese-produced 107mm 12-barrel rocket launcher, in Lebanese Forces service, mounted on a locally camouflaged Israeli Nun-Nun Command Car. (Yves Debay)

The unique hodge-podge combination of arms in the Lebanese Forces is perfectly illustrated in this interesting photograph of a Soviet ZU-23 twin 23mm automatic cannon mounted on the back of an ex-IDF Nun-Nun Command Car with crude local camouflage. (Yves Debay)

The Syrian Army remained a continual presence in Lebanon throughout the civil war, its alliances with various factions changing with bewildering frequency. Here, some T-62 tanks are seen operating in eastern Beirut in 1991. The T-62 was generally rare in the capital, as the Syrians tended to rely on the T-55. (Mohamed Assad)

The IDF along the Lebanon Frontier post-1982



A force of M113's deploy through the rocky and inhospitable terrain of the northern frontier area with Lebanon during a routine security patrol. The 1982 fighting revealed the vulnerability of the M113 to RPG-7 rocket grenades and led to a variety of attempts to improve their protection. The first major rebuild with a new type of stand-off passive armor developed by Rafael is seen here. This type of armor package is sometimes called TOGA. (Jonathan Torgovnik/IDF Spokesman)

Two uparmored IDF M113s with TOGA deploy in a defensive alignment in a southern Lebanese village. Note 40mm grenade launcher mounted in place of the usual .50 cal heavy machine gun for additional firepower. This shows how the TOGA armor is space out from the main body of the M113. (IDF Spokesman)

A force of M113s patrols the muddy terrain of southern Lebanon, March 1985. On the glacis plate is a sectional ladder, infantry packboard and jerry can. The vehicle's .50 cal heavy machine gun mounts a searchlight. The vehicle behind is an M113 Fitter's Vehicle used by the Ordnance Corps for technical support of the M113 in the field. (IDF Spokesman)

An IDF paratrooper M113, re-armored with TOGA and protected by three FN MAG 7.62mm light machine guns, advances along a dangerous road towards Maidun, on 4 May 1988, during the large-scale Israeli raid on the south Lebanon Hizbollah stronghold, while a Centurion Shot, its 105mm gun at the ready, provides cover. (IDF Spokesman)

Having been bloodied in the vicious fighting for Maidun, Centurion Shot tanks depart the village en route back to Israel. The vehicle's name is "Venus" as seen emblazoned on mudguard. (IDF Spokesman)

In November 1992, the IDF again returned to southern Lebanon to carry out reprisals against the Hizbollah guerrillas operating from bases there. To the right is one of the new Merkava Mk. 3 tanks, armed with a 120mm gun, while to the left is a Merkava Mk. 2. (Yves Debay)

The new Merkava Mk. 3 seen here during the 1992 border operations in Lebanon is fitted with a new turret containing thicker layers of new laminate armor. Its most noticeable firepower improvement is the new 120mm gun. (Yves Debay)

A rear view of an IDF Merkava Mk. 3 during the November 1992 mission in Lebanon. The distinctive ball-and-chain armor fitted under the rear turret bustle is very evident in this view. This was added to prevent RPG rockets from striking the undersides of the turret armor or the rear of the turret ring. (Yves Debay)

An M109AL during operations in southern Lebanon in 1992. Israel has been cooperating with the US Army in the development of the M109A6 Paladin, with plans to incorporate some of its features into Israeli M109s in the future. (Yves Debay)

Another view of an IDF M109AL during the November 1992 raids into southern Lebanon. Over time, more and more fittings for external stowage have been added to the M109 by IDF workshops. (Yves Debay)

A group of infantry from the Givaati Brigade deploy near an M109AL during the 1992 operation in southern Lebanon. They are armed with 5.56mm Galil assault rifles. (Yves Debay)

An M577A1 command vehicle accompanies the M109AL battery in southern Lebanon. The M577 is a multipurpose command vehicle, and is used for many functions in artillery units including as a mobile fire direction center. (Yves Debay)

An M113A1 APC fitted with TOGA armor belonging to the Givaati Brigade during the 1992 raid in southern Lebanon. This view shows a new system of shield developed for the M113 when operating in southern Lebanon. The new shields have panels of bulletproof glass, which enables the squad to ride outside the vehicle observing the local terrain, while at the same time being better protected against sniper fire. (Yves Debay)

An M578 tracked transporter moves forward with its artillery battery. This vehicle is based on the M113 chassis and is used in M109 artillery battalions to move ammunition and other supplies. (Yves Debay)

A Givaati Brigade M113A1 with TOGA armor moves forward during the 1992 operations against the Hizbollah. As is noticeable in this view, the outer TOGA panels are perforated metal plates. (Yves Debay)

A Givaati Brigade M113A1 with TOGA armor during operations in southern Lebanon in November 1992. This view shows that the TOGA panels also cover the front of the vehicle. (Yves Debay)

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